the OIL AND GAS JOURNAL

Get a load of this

...FOR LONG ROPE SERVICE IN THE OIL FIELDS

When it's time to switch rotary lines, be ready with tough, flexible *Preformed* Yellow Strand. It's engineered to take quick starts and stops . . . to withstand high speeds . . . to handle the heavy strings required by today's deep tests. For most rotary drilling and casing jobs you'll want 6x19 *Preformed* Yellow Strand. Seale construction, with independent wire rope core. Other B & B wire lines used around the rig, on winches and on pipe-laying equipment deliver corresponding stamina. Get a load of this assistance by specifying *Preformed* Yellow Strand.

Broderick & Bascom Rope Co., St. Louis 15, Mo.

BRODERICK & BASCOM
Yellow Strand
PREFORMED ROTARY LINE

Houston Factory and Branch:
9350 Market Street Road

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The Continental Supply Co.
Mid-Continent Distributors
Stores in All Active Fields

The McJunkin Supply Co.
Charleston, West Virginia

PRICE 50 CENTS TABLE OF CONTENTS PAGE 43 **MARCH 9, 1950**

PERFECTION IN CONTROL *for well head service*

PRESSURES
TO 15,000-LB TEST

UNEXPOSED SEAT

CORROSION RESISTANT

REPACKABLE UNDER PRESSURE

POSITIVE PRESSURE-SEALED PORTS

NORDSTROM VALVES

...now automatically lubricated with

PATENTS APPLIED FOR
Hypermatic
Trade Mark

Keep upkeep down

Ask for Hypermatic Lubricant Bulletin V-211

***Nordstrom Valve Division*—ROCKWELL MANUFACTURING CO.**

400 North Lexington Avenue *Pittsburgh 8, Pa.*

Atlanta, Boston, Chicago, Columbus, Houston, Kansas City, Los Angeles, New York, Pittsburgh, San Francisco, Seattle, Tulsa and Leading Supply Houses. Export: Rockwell Manufacturing Co., International Division, 7701 Empire State Building, New York, New York.

Have You a Gasoline Additive Problem?

Let a Du Pont Field Laboratory Help You

Wherever your refinery is located, there is a Du Pont Field Laboratory within easy calling distance. It is staffed and equipped to determine the additive needs of your fuels—and to recommend the most effective and economical methods of meeting them.

Each Laboratory is prepared to work with you in the use of Du Pont's complete line of gasoline additives—Tetraethyl Lead Compounds, Antioxidants, Metal Deactivator and Dyes. This service includes:

- Induction period evaluations and gum tests to determine antioxidant and Metal Deactivator response.
- Antiknock ratings to check TEL susceptibility of blending stocks and octane number of finished gasolines.
- Color determinations for dye studies.
- The many standard gasoline inspection tests.
- Other assistance in the use of additives.

These Laboratories are ready not only to assist in the use of Du Pont Additives, but to check your own laboratory findings as well.

So, when you have a gasoline additive problem, let the nearest Field Laboratory make the necessary recommendations from Du Pont's complete line of gasoline additives. Just call your Petroleum Chemicals representative or write the nearest District Office listed below.

Each Field Laboratory is equipped to render complete service on gasoline testing and the use of additives.

DU PONT

Better Things For Better Living
...Through Chemistry

Petroleum Chemicals

LOOK TO DU PONT FOR ALL OF YOUR GASOLINE ADDITIVES

Tetraethyl Lead Compounds (Aviation Mix—Motor Mix) . . . Antioxidants . . . Metal Deactivator . . . Dyes.

E. I. DU PONT DE NEMOURS & COMPANY (INC.)
Petroleum Chemicals Division • Wilmington 98, Delaware

District Offices: Wilmington, Del. · Chicago, Ill. · Tulsa, Okla. · Houston, Texas · Los Angeles, Calif.

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Protected Power!

Fairbanks-Morse QZK Motors on your pumping rigs mean protected power. Falling particles, dripping liquids can't hurt this motor. Its one-piece cast frame of unique design completely protects the motor in any position. This positive protection and other great features . . . the exclusive indestructible copperspun rotor . . . efficient cross-flow ventilation . . . cartridge type ball bearing mountings . . . and measured lubrication are your assurance of better pumping performance. Fairbanks, Morse & Co., Chicago 5, Ill.

FAIRBANKS-MORSE

A name worth remembering

OIL FIELD EQUIPMENT • DIESEL LOCOMOTIVES • DIESEL ENGINES • PUMPS
SCALES • MOTORS • GENERATORS • STOKERS • RAILROAD MOTOR CARS
and STANDPIPES • FARM EQUIPMENT • MAGNETOS

There's a Macwhyte rope that's the right rope . . .

For rotary drilling

For cable tool drilling

For well servicing

For pipelines

A thousand and one
WIRE ROPES
made by
MACWHYTE,
all job-proved . . .

Because your equipment is designed specially for the work you are doing, you'll get the best service by using wire rope *specially designed* for your equipment.

From the thousand and one wire ropes made by Macwhyte, you're sure to get the wire line specially designed for and suited to your needs.

The specialized experience of Macwhyte engineers is yours for the asking—to get recommendations for all your needs, just call a Macwhyte distributor or write Macwhyte Company.

MACWHYTE COMPANY, 2916 Fourteenth Avenue, Kenosha, Wisconsin. Manufacturers of Monarch Whyte Strand PREformed, Internally Lubricated Wire Rope, Atlas Braided Wire Rope Slings, Aircraft Cables and Assemblies, Monel Metal and Stainless Steel Wire Rope. Mill Depots: New York • Pittsburgh • Chicago • Minneapolis • Fort Worth • Portland • Seattle • San Francisco • Los Angeles. Catalog on request.

2590
extra barrels every month for 6½ years

with

BLACK MAGIC
OIL BASE DRILLING FLUID

These two offsets, drilled on a California lease in 1940 by a major oil company, were similar in every detail. They were drilled to the same reservoir within a few hundred yards of each other. Their logs and cores showed a close relationship from top to bottom. Only on one known factor did they differ: Well A was completed with a water base mud while Well B was completed with an oil base mud.*

On October 10, 1940, the first Specific Productivity Index was .00611. On April 11, 1947, 6½ years later (the date of the last reading), the SPI was .00132. It had dropped to 21% of its original pressure. Total production during this 78 month period was 256,000 bbls., an average of 3285 bbls. a month.

The first SPI taken on September 24, 1940, was .00789. On August 19, 1947, the SPI was .00294. In 83 months it had declined to 37% of its original. Total production was 487,500 bbls., a monthly average of 5875 bbls., an increase of 2590 bbls. every month over Well A.

NOTE THE SIMILARITY OF THESE OFFSET WELLS

	WELL A	WELL B
Sand Thickness	180 ft.	190 ft.
Average Sand Permeability	115 md.	105 md.
Static Pressure	3135 psi	3100 psi
Millidarcy feet of sand	20,700	19,950

* The oil base mud used in this well contained air-blown asphalt and was mixed with a refined type oil. After several improvements this mud became known as Black Magic.

BLACK MAGIC ASSURES MAXIMUM RECOVERY

These wells were produced under proration conditions and represent normal depletion practices. In spite of the fact that Well A flowed an average of 3285 bbls. monthly, it still was producing far below its ultimate potential due to Jamin action (water blocking), the result of drilling into the production zone with water base muds. The difference in the size of Wells A and B proves beyond question that water blocking damages a well permanently, hastens the day it will be shut down.

Black Magic with a filtrate loss of zero cannot possibly mud off or water block the oil sands. Black Magic deposits a thin mud cake that readily disintegrates when displaced by crude. It helps instead of hinders production and on occasion has made commercial producers out of dry holes. For full information write for paper "What Happens Tomorrow?"

OIL BASE, INC., 130 Oris Street, Compton, Calif.
Bakersfield • Long Beach • Ventura
EXPORT: Elmer R. Smith, Caracas, Venezuela; G. Saavedra E. Hijos, I. de R.L. Mexico, D.F.

***BLACK MAGIC* is represented east of California by:**
CORE LABORATORIES, INC., Dallas, Texas
Houston, Corpus Christi, Shreveport, Tyler, Lafayette, Natchez, Oklahoma City, Denver, Midland, Abilene, Reagely, Worland, Calgary, Edmonton

CORE LAB
PETROLEUM RESERVOIR ENGINEERING

7 Reasons-

THEY'RE ADAPTABLE!

Pillow blocks available with fixed or floating bearing. (Fixed bearing shown)

THEY CARRY THEIR FULL LOAD!

Self-aligning double row of concave rollers between convex raceways provide full contact, full load capacity, even with shaft deflection or misalignment.

CLEAN OPERATION

Effective seal keeps grease or oil in, dirt out!

FEWER GREASINGS!

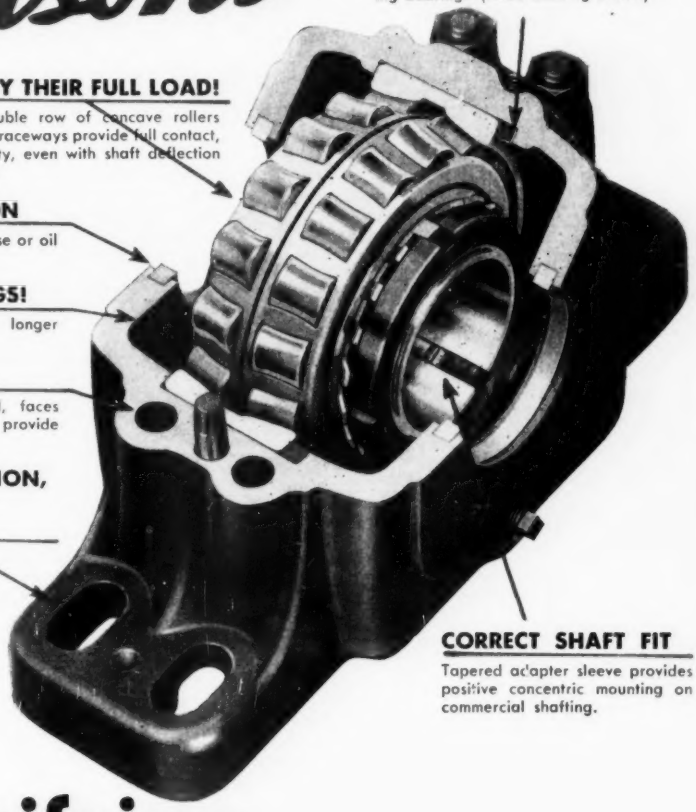
Large reservoir allows longer greasing intervals.

PRECISION FIT

Base and cap doweled, faces accurately ground, to provide leak-proof joint.

EASY INSTALLATION, INSPECTION, DISASSEMBLY

Rugged, two-piece cast housing is simple, with slotted bolt holes for easy mounting.



CORRECT SHAFT FIT

Tapered adapter sleeve provides positive concentric mounting on commercial shafting.

for Specifying

Better and longer service are your prime considerations in choosing such vital equipment as ball and roller bearings. Every feature of Link-Belt bearings is calculated to contribute to their efficiency and endurance. The engineering knowledge of the Link-Belt organization and the unexcelled facilities of a plant devoted entirely to manufacturing precision ball and roller bearings are your assurance of maximum service.

Illustrated above is Series 6800 Roller Bearing Pillow Block, tapered adapter sleeve type; also made in Series 7800 and 7900 press fit type for precision shafting. Other standard models are available in ball and roller bearing types, for various shaft sizes, solid or split housings, open or closed ends, in pillow blocks, cartridge, flanged cartridge, flanged, hanger and takeup blocks. Available from stock at factory branch stores and distributors located throughout the nation and many representatives in other countries of the world.

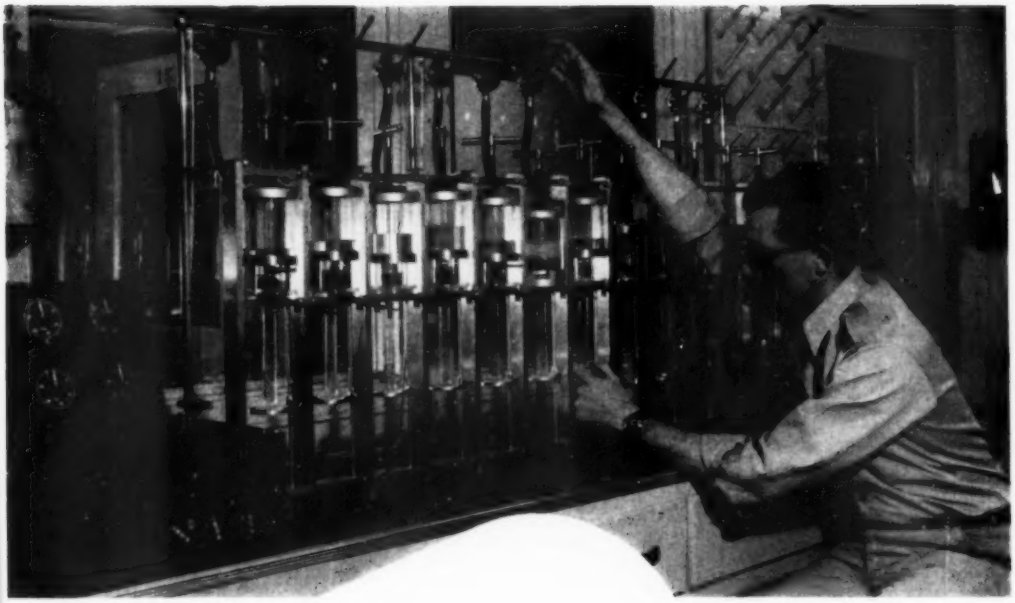
Complete data in Catalog 2550. Send for your copy.

LINK-BELT
Self-Aligning
BALL and ROLLER BEARINGS

THE SYMBOL OF QUALITY · LB · LINK-BELT

LINK-BELT COMPANY 11.733

Indianapolis 6, Chicago 9, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8. Offices, Factory Branch Stores and Distributors in Principal Cities.



THIS MAN IS WORKING ON THE BOTTOM OF AN OIL WELL

He is, actually, studying the formation 2 miles down a bore hole. The Sunday name of the apparatus he uses is core analysis liquid permeameter, but the Baroid engineers who built it and operate it simply jot "Calp" in their notebooks. Calp occupies a lot of their time for it enables them to study the effect of various fluids upon the permeability of oil field cores to other fluids. Simply, this multiple apparatus shows the degree to which various drilling muds interfere with the flow of oil to the well.

The end result of the use of this specially-built Baroid equipment is the development of drilling fluids tailored to well conditions. To the oil industry this means earlier and greater production in the individual well.

Baroid
BAROID SALES DIVISION
NATIONAL LEAD COMPANY
LOS ANGELES 13 · TULSA 3 · HOUSTON 2

RESEARCH IN MUD

This 145-horsepower Series F-7 Ford Truck has a Gross Train Weight rating of 35,000 lbs.

"We make one extra trip per week and cut our hauling cost per tank-load" —SAYS Wm. R. RUFFLES, Jr.

RUFFLES COMPANY, FAIRHOPE, ALABAMA

"One reason for the remarkable record of our Series F-7 Ford Truck is brought out by tachograph charts," reports Wm. R. Ruffles, Jr.

"These charts show that our Ford maintains uniform maximum efficiency. It has the ability to get up and go when necessary and to get down and pull when required. Our driver advises us that he overtakes larger tractors on long uphill pulls. As a result we've cut our cost per tank-load 3.6%."

In any line of business, *Ford Trucks do more per dollar!* They go easy on expense for gas, oil and repairs. They're strong on work output. Ford Trucks are built with big reserves of strength and power to handle big loads at low cost.

Let your Ford Dealer show you which one of over 175 models is the one right truck for your job.

HERE'S WHY AMERICA'S NO. 1 TRUCK VALUE WILL DO MORE PER DOLLAR FOR YOU!

- **SAVE GAS** with Ford Loadomatic Ignition and High Turbulence combustion chambers.
- **SAVE OIL** with Ford Flightlight aluminum alloy pistons.
- **SAVE WEAR** with pressure lubricated main and crankpin bearings, Double Channel frame, extra heavy duty axles, big brakes (up to 16-in. x 5-in.).
- **SAVE ON REPAIRS** with demountable brake drums, brake inspection hole, engine-top setting of accessories, plus nationwide service from over 6,400 Ford Dealers.
- **SAVE TIME** with Ford reliability and performance. Up to 145 horsepower. Only Ford gives you a choice of V-8 or Six!

Ford Trucks Cost Less Because –

FORD TRUCKS LAST LONGER

Using latest registration data on 6,106,000 trucks, life insurance experts prove Ford Trucks last longer!

Oceco — (and other divisions of The Johnston & Jennings Co.) . . . has been purchased by the Pettibone Mulliken Corporation, a 70 year old Chicago concern with more than $11,000,000 of assets.

Our entire inventory of vent valves, flame arrestors, gauges, swing lines and other equipment, manufacturing facilities, and all records, are being moved to our new address 4700 West Division Street, Chicago 51.

Here, in a completely modern 30 acre plant with enlarged design and engineering departments, latest laboratory and testing facilities, modern high speed machines, and up-to-the-minute manufacturing techniques, we will produce a better product—faster—and at lower cost.

OCECO

Please note
the new address:

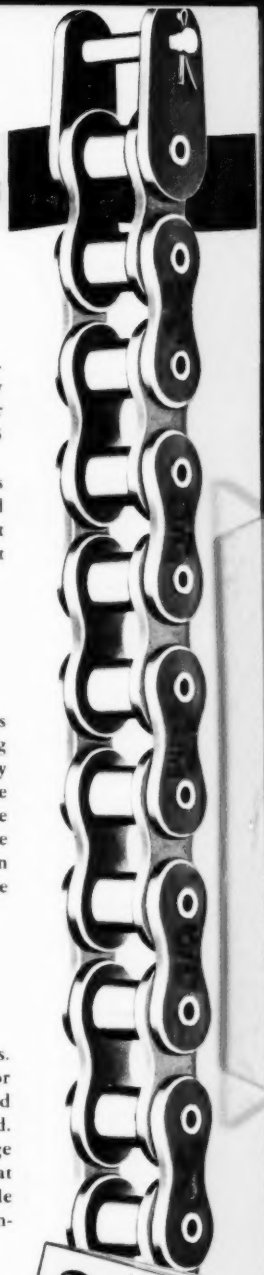
THE JOHNSTON & JENNINGS COMPANY

4700 West Division Street • Chicago 51, Illinois

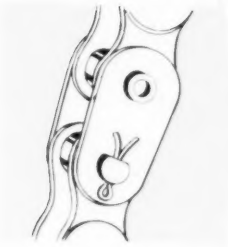
★ ★ *division of* **PETTIBONE MULLIKEN CORPORATION** ★ ★

Easy does it...

with the NEW "BA" Riveted Oil Field Roller Chains



EASY TO TAKE APART



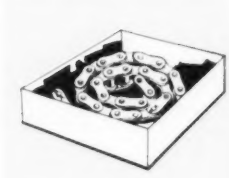
The radically different single pin connector link of "BA" . . . Baldwin Assembly . . . Riveted Oil Field Roller Chain makes it easy to take apart or assemble the chain. Readily distinguished by their "teardrop" shape, two single pin connectors are located in each 5 feet of chain.

One end of the special pin is spun over a washer . . . the other has a milled flat which fits into a special hole in the connector plate and is secured by a cotter. The pin is a slip fit through the link except for the milled flat end. Thus, it is easy to drive out the pin without damaging chain parts.

EASY TO REPAIR AND ADJUST

In addition to the ease of assembly and disassembly, "BA" Chains make adjustment and repair easy. A 3-pitch repair unit consisting of a standard roller link and two single pin connector links is easy to couple into a chain strand. Since most repair jobs require the trimming out of at least one pin link and one roller link, the 3-pitch repair unit offers the most convenient way to couple the chain strand. BUY THEM NOW. Keep a standard repair link on hand for every roller chain drive on your rig. Interchangeable with any standard roller chain.

EASIER, FASTER SERVICE



The "BA" Assembly is shipped in boxes in standard 5-foot lengths. Each basic length has 2 single pin connectors. Thus, it's easy for your supply store to *build up* from the basic lengths, plus standard smaller assembly sections, the *exact* length of chain required. There is no need to cut the riveted chain with consequent damage to press fits and chain parts. In addition, it is recommended that offset links be assembled at 5-foot intervals following the single pin connector links. These offsets can be removed easily to compensate for normal chain elongation.

With "BA" Assembly, you get the longer life and lower cost of riveted roller chain plus amazingly easy assembly and disassembly.

BALDWIN·REX

ROLLER CHAINS

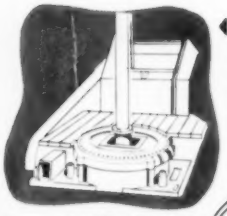
a complete line from ¼-inch to 2½-inch pitch

For all the facts on the "BA" Assembly, Rex A.P.I. Chains and Rex Oil Field pumps, see your local supply store or write for your copies of Bulletins 49-29 and 47-12. Chain Belt Company, 1619 West Bruce Street, Milwaukee 4, Wis.

PRINTED IN U.S.A.

REX OFFSET SIDE BAR ROLLER CHAINS

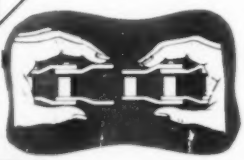
for the Tough, Dirty Drilling Jobs



Rex Offset Side Bar Roller Chains can accommodate minor misalignments . . . operate efficiently in dusty, dirty locations.

Rex Offset Side Bar Roller Chains have highly finished parts, held to close tolerances.

Rex Offset Side Bar Roller Chains are stacked in boxes in convenient 10-foot lengths.

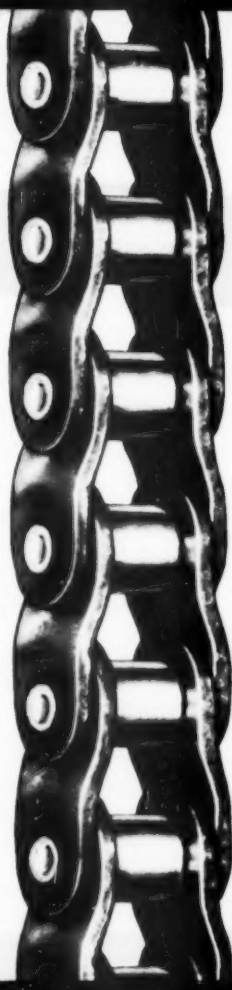


Rex Offset Side Bar Roller Chains are easy to couple . . . to alter length by one or more pitches.

Rex Offset Side Bar Roller Chains were "born in the oil fields" . . . designed to answer the need for a chain for exposed drives where conditions of dust, dirt or occasional misalignment make standard roller chains unsuitable.

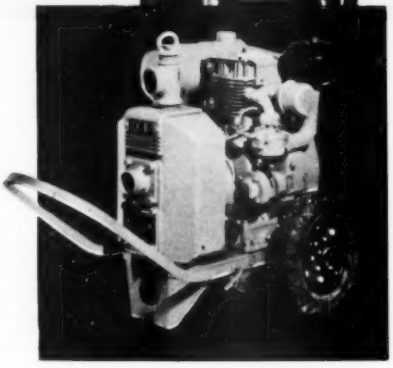
These chains are designed with built-in clearances between working parts that enable the chain to stand up under adverse operating conditions. The rotary table drive, for example, is typical of the type of service where Rex Offset Side Bar Roller Chains are the ideal answer.

These chains are similar to the famous Rex A.P.I. Chains in general appearance . . . have the same basic offset side bar construction. However, they are built to the same close tolerances, to the same finishes and dimensions of standard roller chains. The offset design makes it easy to alter the length of chain by one or more pitches at any point in the chain.



REX OIL FIELD PUMPS

the Little Yellow Pumps That:



You find everywhere in the oil fields, doing everything from dewatering ditches to salvaging oil from the pits.

The exceptional all-round portability of these handy self-priming centrifugals, plus their outstanding durability and efficiency, makes them the top choice for oil field utility service.

Pump body is pressed steel that's unbeatable for durability . . . can be repaired by welding. The exclusive Rex adjustable "air peeler" and replaceable wearing plate assure new pump efficiency for the lifetime of the pump. All these *plus* advantages mean better service with less maintenance and repair costs to you.

Rex Oil Field Utility Pumps are available in a range of capacities to fit every oil field service.

Rex Oil Field Sales Offices Are Located in the Following Cities:
NEW YORK • TULSA • DALLAS • HOUSTON • MIDLAND • LOS ANGELES

CHAIN BELT COMPANY

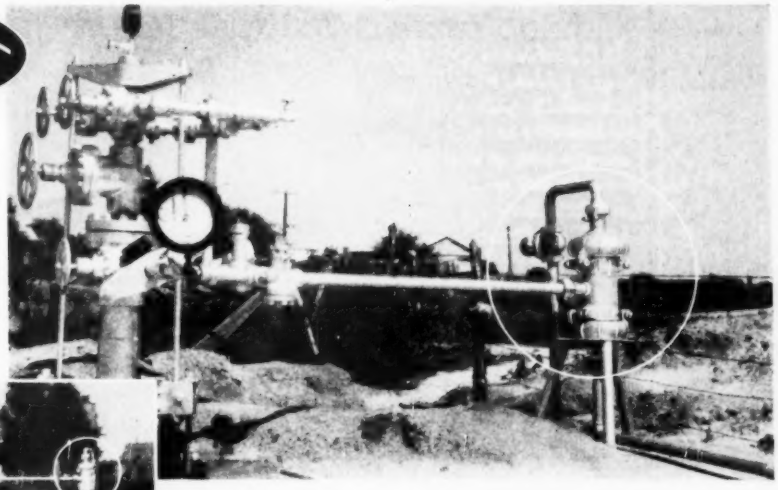
BALDWIN-DUCKWORTH DIVISION
Springfield 2, Mass.

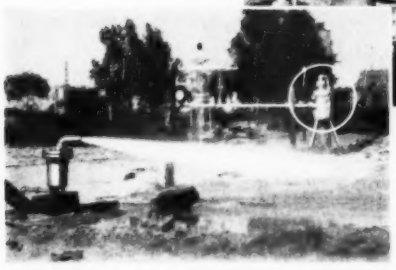
REX CHAIN & TRANSMISSION DIVISION
Milwaukee 4, Wis.

REX CONSTRUCTION MACHINERY DIVISION
Milwaukee 4, Wis.

More Efficient
GAS SCRUBBERS
...at the Well

AEROTEC





TOP: View of Aerotec Gas Scrubber at the well. The Aerotec unit, in circle, is simple, easy to install and highly efficient.

BOTTOM: Armstrong trap in foreground discharges liquid and solids every 3-4 minutes, from continuous discharge of Aerotec unit in background.

Aerotec Gas Scrubbers are tailored to "at the well" jobs.

These smaller units have proved themselves under severe operating conditions where excessive amounts of liquid, condensate and dust are present in the gas being cleaned.

The 2-year old installation illustrated here precipitates 30 bbls. per MM SCFD of gas. The drips, previously always flooded, were practically dry following installation of this Aerotec Scrubber.

The Aerotec precipitating tube, basis of Aerotec Gas Scrubbers, features a continuous discharge, which in this case was through an Armstrong trap, discharging every 3-4 minutes. This feature eliminates any possibility of sedimentation or clogging up of a sump tank, and the scrubber is always free for continuous operation.

Call or write for Catalog 501-1W, giving full details and sizes of these improvements in Gas Scrubbers.

Project and Sales Engineers

THE THERMIX CORPORATION

Greenwich, Connecticut

(Offices in 28 Principal Cities)

Canadian Affiliates: T. C. CHOWN, LTD., 1440 St. Catherine St., W., Montreal 25, Quebec

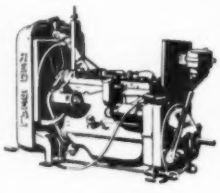
THE AEROTEC CORPORATION

GREENWICH, CONN.

SAVE BY STANDARDIZING
ON CONTINENTAL RED SEAL POWER

Continental Red Seal engines are available for so many different drilling, producing, pipe line and processing jobs that you'll save real money today by standardizing on Red Seals for all the numerous oil industry applications within their power range. This policy assures you of 24-hour dependability, day in and day out, because every Continental model is built to do one job and do it well. It greatly simplifies maintenance, by making parts available through a single source. It gives you full advantage of Continental's unusually wide interchangeability of parts. It reduces the inventory needed to assure you of replacements and enables you, in a real emergency, to borrow from an idle engine and resume operations with a minimum of costly down time. There's Continental service near you. And it's backed by master warehouses at Dallas, Los Angeles and Muskegon, to make sure you get what you need the way you need it—quick.

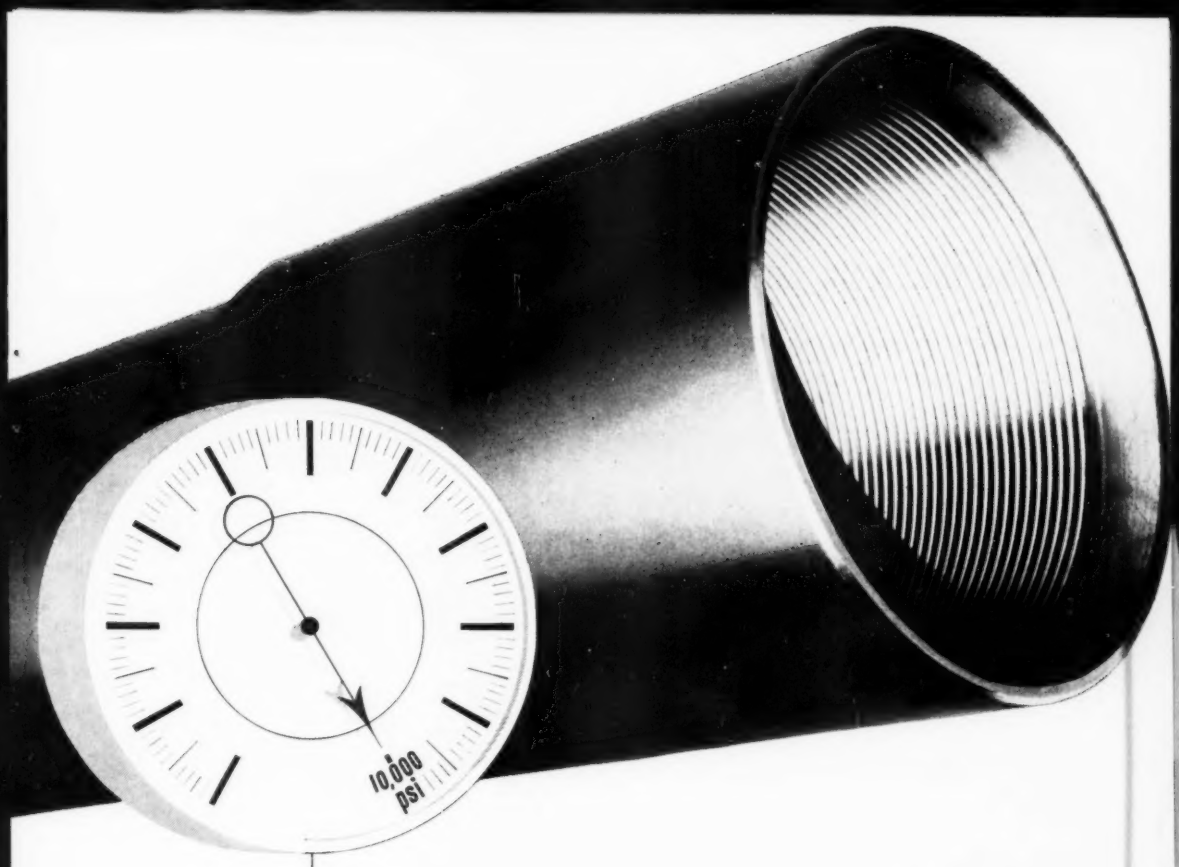
SEE OUR CATALOG IN COMPOSITE CATALOG



Model F-226
Open Power Unit

L-Head type, 25 to 40 h.p. for continuous duty; 30 to 45 h.p. for intermittent duty.

Continental Motors Corporation
MUSKEGON, MICHIGAN
6218 CEDAR SPRINGS ROAD • DALLAS 9, TEXAS
3817 S. SANTA FE AVENUE • LOS ANGELES 11, CALIFORNIA



In high pressure operations you get greater security with Pittsburgh Casing tested in tension up to 10,000 p.s.i.

The exclusive service of testing casing in tension up to 10,000 psi by *Pittsburgh* closely approaches operating conditions in the well. It is your assurance that your string will have fewer leakers, give you greater security when operating under high pressures.

For extra security order *Pittsburgh Seamless Casing*—have it hydrostatically tested *in tension.* Ask your *Pittsburgh* field engineer for full particulars or write for information to Pittsburgh Steel Company, Department OG, Grant Building, Pittsburgh 30, Pa.

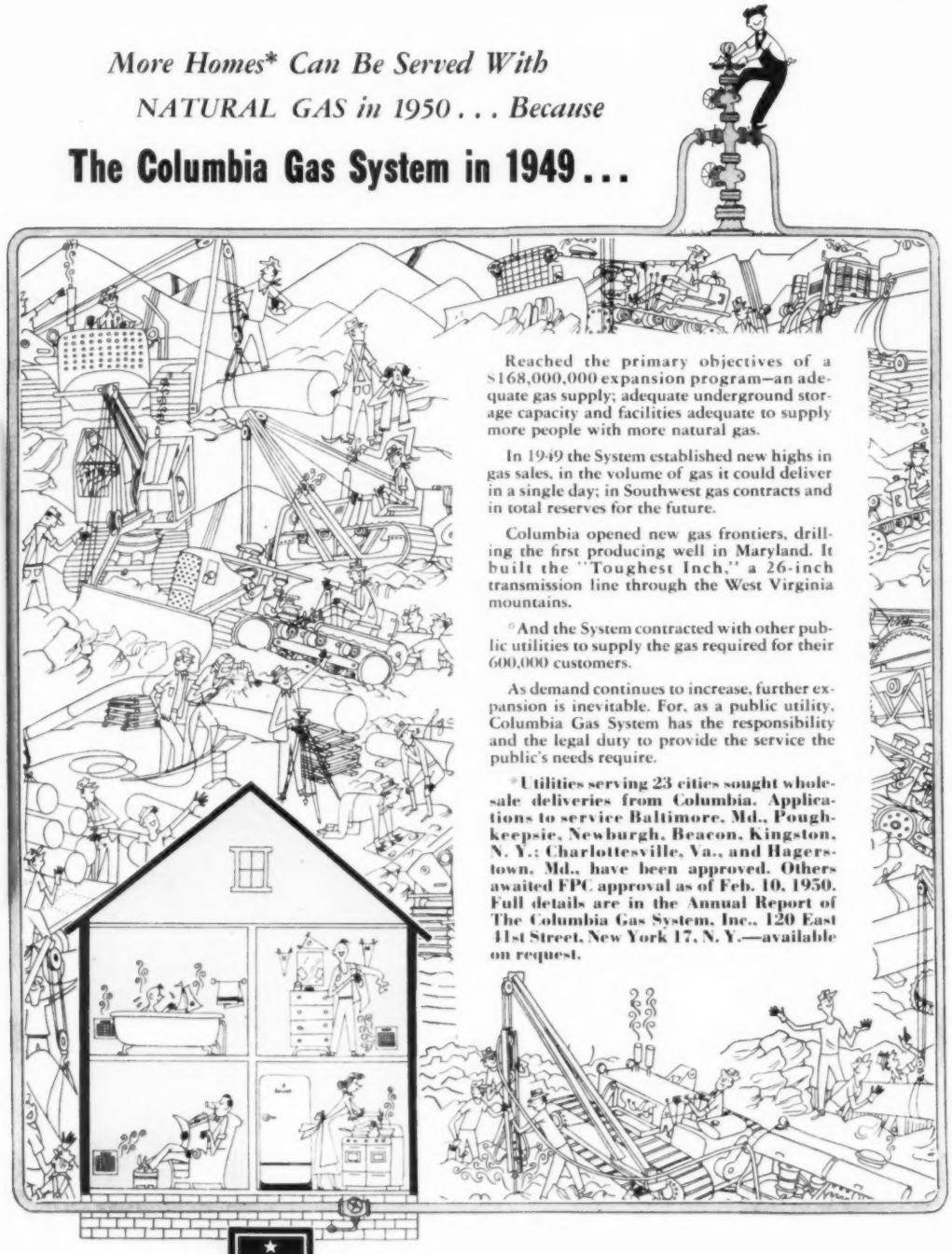
Pittsburgh Seamless Casing

a product of

Pittsburgh Steel Company

More Homes Can Be Served With*
NATURAL GAS in 1950 . . . Because

The Columbia Gas System in 1949 . . .



Reached the primary objectives of a $168,000,000 expansion program—an adequate gas supply; adequate underground storage capacity and facilities adequate to supply more people with more natural gas.

In 1949 the System established new highs in gas sales, in the volume of gas it could deliver in a single day; in Southwest gas contracts and in total reserves for the future.

Columbia opened new gas frontiers, drilling the first producing well in Maryland. It built the "Toughest Inch," a 26-inch transmission line through the West Virginia mountains.

*And the System contracted with other public utilities to supply the gas required for their 600,000 customers.

As demand continues to increase, further expansion is inevitable. For, as a public utility, Columbia Gas System has the responsibility and the legal duty to provide the service the public's needs require.

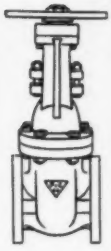
***Utilities serving 23 cities sought wholesale deliveries from Columbia. Applications to service Baltimore, Md., Poughkeepsie, Newburgh, Beacon, Kingston, N. Y.; Charlottesville, Va., and Hagerstown, Md., have been approved. Others awaited FPC approval as of Feb. 10, 1950. Full details are in the Annual Report of The Columbia Gas System, Inc., 120 East 41st Street, New York 17, N. Y.—available on request.**

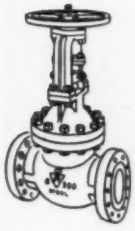
COLUMBIA GAS SYSTEM

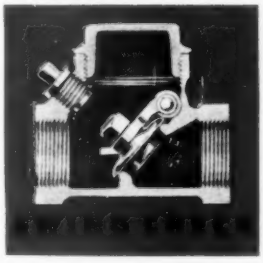
The Columbia Gas System

Quick-Acting · Positive · Dependable

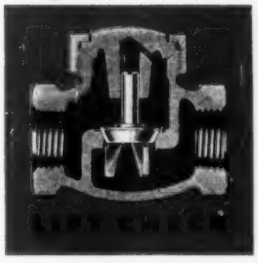
BRONZE CHECK VALVES by R·P&C







• For use where flow is not pulsating—where velocity is low or moderate. Has renewable disc, regrinding seat. Disc free to rotate, thus distributes wear uniformly over disc and seat.



• For services where flow is pulsating or velocity high. Generally used with Globe and Angle valves. Resistance to flow greater than Swing Check. Suitable in horizontal lines only.

***For information** about bronze, iron and steel globe, angle and check valves — bar stock valves — iron cocks — cast steel fittings — get in touch with your R-P&C distributor.*

ACCO

Reading, Pa. · Atlanta · Baltimore · Boston · Chicago · Denver · Detroit · Houston
New York · Philadelphia · Pittsburgh · San Francisco · Bridgeport, Conn.

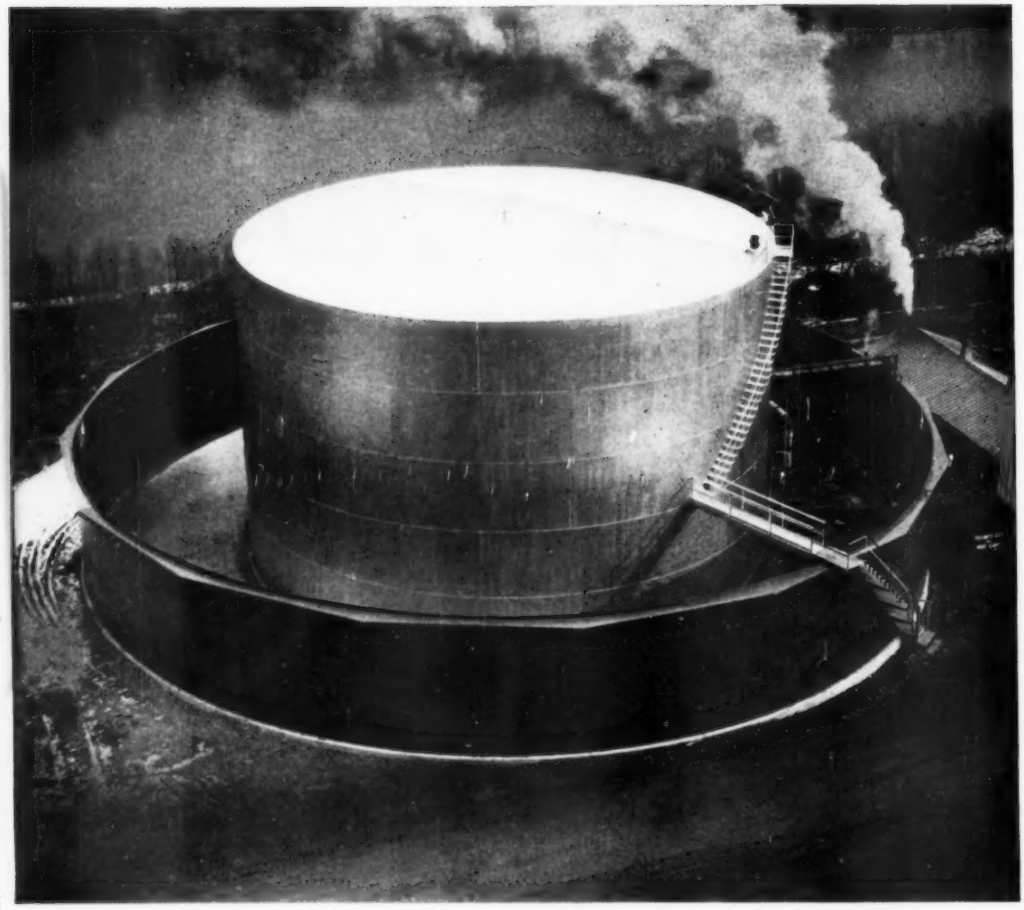
R-P & C VALVE DIVISION
AMERICAN CHAIN & CABLE

TRADE MARK

READING-PRATT & CADY VALVES

We build Storage Tanks

to meet your needs



25,000-bbl all-welded oil storage tank, with firewall, recently built by Bethlehem.

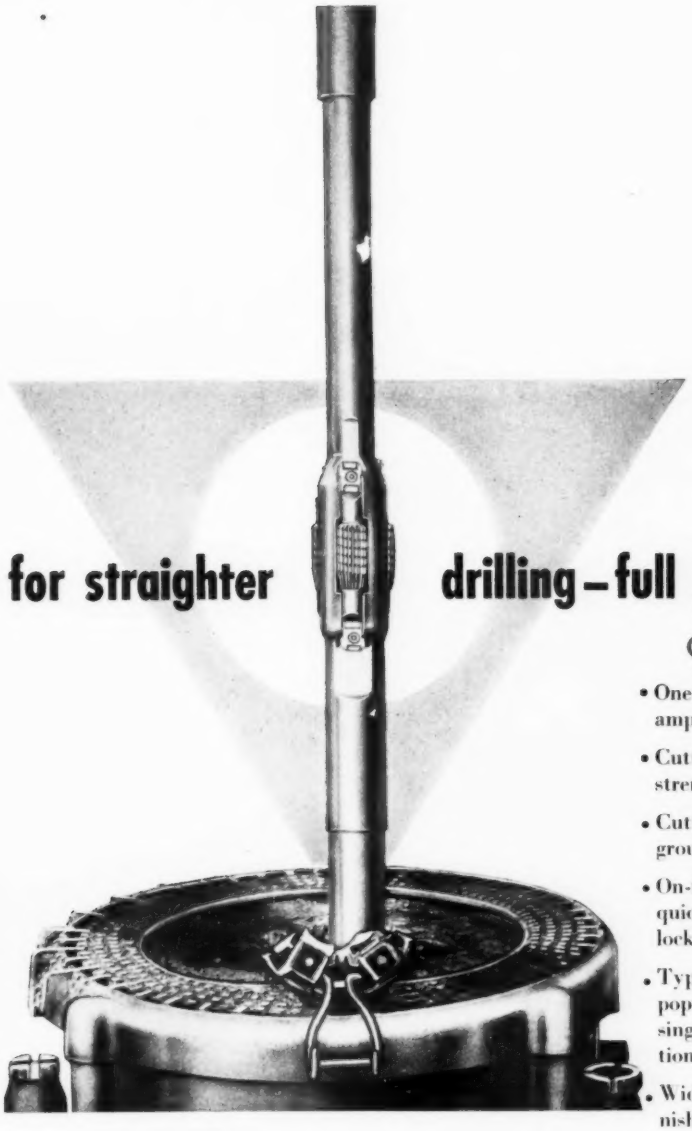
BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

FABRICATED STEEL CONSTRUCTION

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL



for straighter drilling—full gage holes

CP *type B Reamers*

- One-piece streamlined body design . . . ample room for return of cuttings.
- Cutter pockets provide exceptional strength.
- Cutters assembled on hardened and ground pins . . . held safely in body.
- On-the-rig replacements of cutters is quick and easy, thanks to patented locking device.
- Type B Reamers are available in all popular sizes . . . in either double or single stage reamers . . . with connections as desired.
- Wide range of cutter sizes can be furnished for each body size.
- Prompt service assured in Mid-Continent and Rocky Mountain fields.

CHICAGO PNEUMATIC TOOL COMPANY

MANUFACTURED AT FRANKLIN, PA.

GENERAL & EXPORT OFFICES: 6 EAST 44th STREET, NEW YORK 17, N. Y.

Oil Tool Sales Office: One N. W. 16th Street, Oklahoma City, Oklahoma

STRIKE?

no..they're out because of a broken bolt!

You're looking at a group of production workers who have been laid off temporarily—because a certain bolt in an all-important drive corroded to failure.

One of the most regrettable aspects of this situation is that it *could* have been avoided . . . by specifying non-ferrous or stainless steel fastenings at the time the equipment was purchased; or by replacing common steel fastenings *on delivery* with bolts, nuts, screws, rivets and accessories that *resist* corrosion.

Harper specializes in these Everlasting Fastenings; makes them in over 7000 different sizes, types and alloys—Brass, Bronzes, Copper, Monel and Stainless Steels. Large quantities are maintained in stock for immediate delivery to manufacturers everywhere who know by experience the extra qualities you get in Harper fastenings—better appearance, longer life, ease of cleaning and resistance to high temperatures. They're most economical in the long run.

Write today for 134-page catalog and current stock list. The H. M. Harper Company, 8208 Lehigh Avenue, Morton Grove, Illinois

New York Office and Warehouse: 200 Hudson St.
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Branch Offices: Atlanta, Cambridge, Cincinnati, Cleveland, Dallas, Denver, Detroit, Grand Rapids, Milwaukee, Oakland, Philadelphia, Pittsburgh, St. Louis, Seattle, Toronto (Canada)

AMERICA'S LEADING SPECIALIST IN NON-FERROUS AND STAINLESS STEEL FASTENINGS

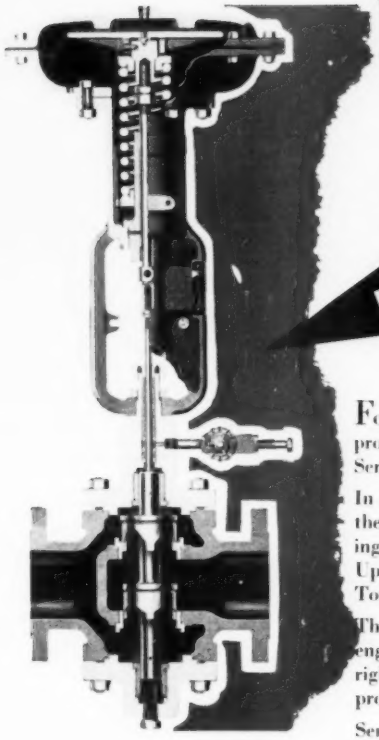
HARPER

EVERLASTING FASTENINGS

• There are many diaphragm control valves...but

You'll WANT THE

HONEYWELL SERIES "700"



For a diaphragm-operated valve that affords utmost precision in proportional high-lift control . . . your best bet is the Honeywell Series "700."

In addition to the usual features you expect to find in a fine valve, the "700" gives you: Pre-molded Neoprene Diaphragm with Rolling Action. Pivot-Mounted Inner Plate and Cradle-Mounted Upper Spring Flange. Duplex Bearing for Stem. One-Piece Bonnet. Top and Bottom-Guided Disc.

The quality of the Series "700" stems from years of research and engineering know-how . . . in designing the right valve, from the right material, with the right specifications for the more complex process applications.

Service, when needed, is available from the Honeywell nationwide network of branch offices and factory-trained field engineers . . . as near to you as your phone. Call in your local Honeywell engineer today . . . for detailed information.

Investigate the Series "700" . . . today . . . write for Bulletin 700-2

COMMERCIAL • RESIDENTIAL • INDUSTRIAL
WORLD'S LARGEST ORGANIZATION FOR ADVANCED INSTRUMENTATION AND CONTROL

MINNEAPOLIS-HONEYWELL REGULATOR CO.
INDUSTRIAL DIVISION
1906 Windrim Avenue, Philadelphia 44, Pa.
Offices in 77 principal cities of the United States, Canada and throughout the world

Honeywell
DIAPHRAGM VALVES
AND PROCESS CONTROL SPECIALTIES

A complete line of
quality petroleum products

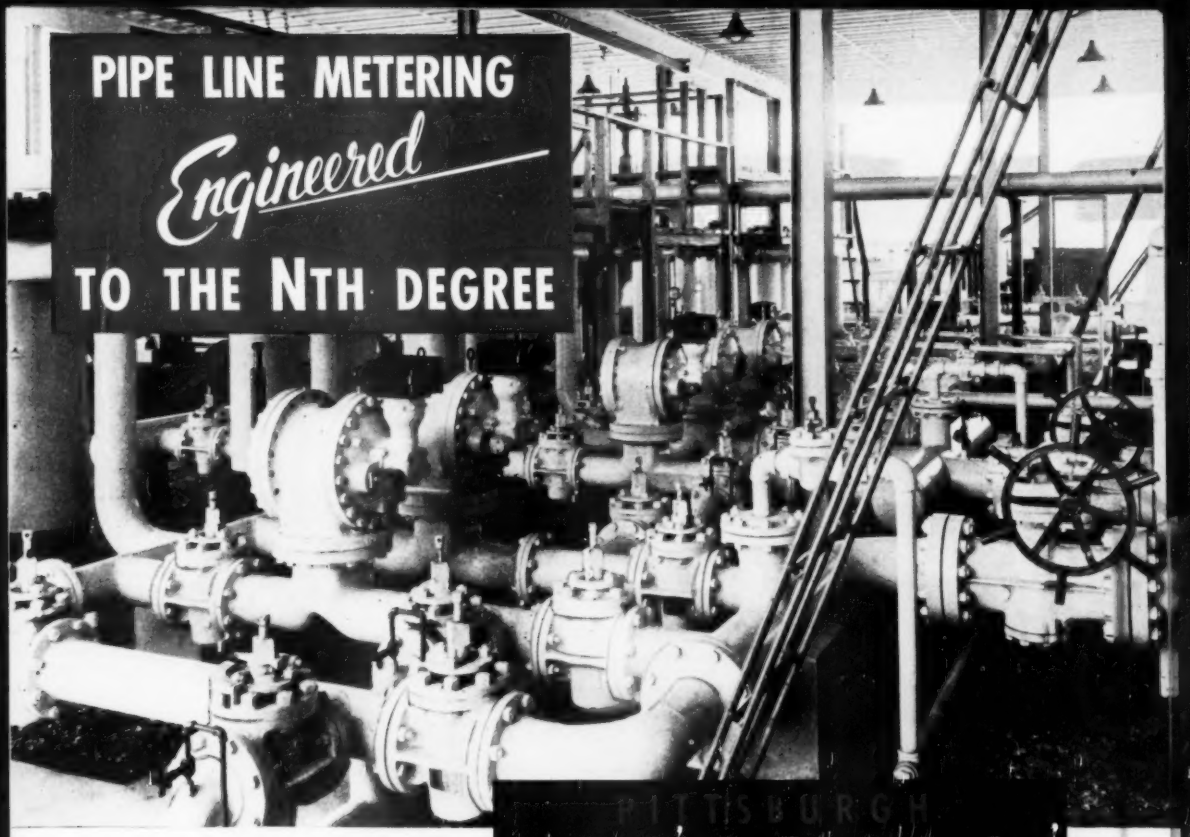
Gulf Oil Corporation • Gulf Refining Company

Gulf Building, Pittsburgh, Pa.

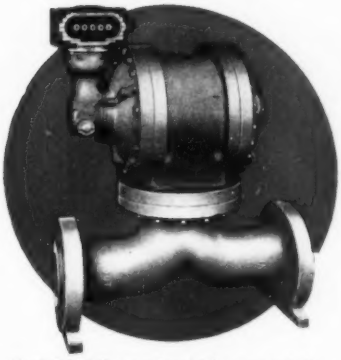
Sales Offices — Warehouses

Located in principal cities and towns throughout
Gulf's marketing territory

PIPE LINE METERING *Engineered* TO THE NTH DEGREE



Meter bank on Plantation line. Model 6 PL Rotocycles with straight reading registers and temperature compensators are used.



Model 6 PL Rotocycle with large straight reading re-set register—capacity 1150 barrels per hour. Three smaller sizes available. Ticket printers and other type registers optional.

PITTSBURGH

ROTOCYCLE

METERS

COUNT OUT THE BARRELS AS THEY ROLL THROUGH THE LINE

The battery of Rotocycle meters pictured is typical of hundreds of installations on major pipe lines throughout the country. Here is measurement engineering at its finest. The battery type installation assures stand-by equipment available for maintenance, proving and shut downs. The size and number of Rotocycle meters has been carefully calculated in relation to full line capacity. Manifolding is flexible. All lines are under the quick, positive control of Nordstrom valves. Want the finest pipe line meters and the all-important measurement engineered installations that go with them? Then get in touch with our nearest District Office.

Pittsburgh Equitable Meter Division ROCKWELL MANUFACTURING COMPANY

Pittsburgh 8, Pa.

Atlanta Boston Chicago Columbus Houston Kansas City Los Angeles New York Pittsburgh San Francisco Seattle Tulsa

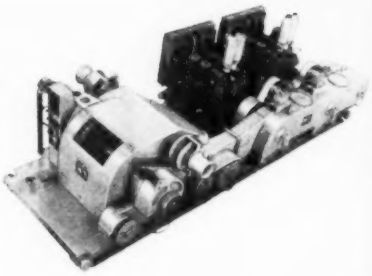
There's a BREWSTER RIG to fit any job—BETTER!

All with MATCHED EQUIPMENT

. . . to 8500'

BREWSTER **N-7**

Here's POWER to spare! Reasonable INITIAL COST, high PORTABILITY, ECONOMY of operation and maintenance has proved the N-7 fits the job of 8500' programs—better. And like all Brewster rigs, it has added advantages of perfectly MATCHED EQUIPMENT and 24-HOUR FIELD SERVICE anywhere in U. S.



6-S SWIVEL

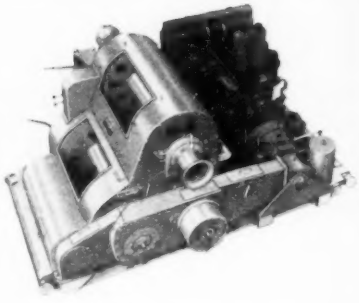
TB 200 BLOCK

RS 22 ROTARY

. . . to 5500'

BREWSTER **N-4**

SPEED and FLEXIBILITY characterize the Brewster N-4. Entirely air controlled, Torque converter(s) automatically supply maximum engine power with minimum engine effort. It's easily moved in one load. In single or double drum models—one or two engines—single or twin torque. "Hottest" rig in years.



4-S SWIVEL

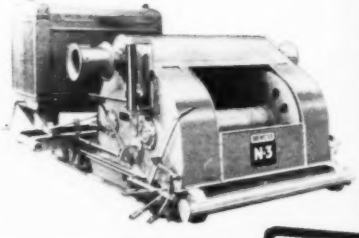
H-100 BLOCK

RS-18 ROTARY

. . . to 3500'

BREWSTER **N-3**

Easy to move—fast to rig up the highly portable N-3 is unitized on a single skid with all controls at driller's position. The ideal rig for shallow drilling to 3500' or deep well servicing. The N-3 is available with single or double drum. Removable front drum cover section for convenience in well servicing.



3-S SWIVEL

H-50 BLOCK

OB-12-L ROTARY

THE BREWSTER COMPANY, INC.

Manufacturers of Drilling Equipment Since 1910

SHREVEPORT, LOUISIANA

Brewster Drilling Equipment is Sold by:

APEX EQUIPMENT CO.
BOYARD SUPPLY CO.
INDUSTRIAL SUPPLY CO.
MURRAY BROOKS, INC.
REAMS SUPPLY CO.
HALEY SUPPLY CO.
Calgary, Canada

BREWSTER MATCHED *Drilling Equipment*

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- HOMES
- WAREHOUSES
- DORMITORIES
- SCHOOLS
- GARAGES

● Above is a newly-erected school built exclusively of STURDYBILT prefabricated sections. This is an example of the variety of buildings that STURDYBILT offers.

Homes, dormitories, tool houses, garages, offices, or whatever type and size building the oil industry needs is readily available. The quality, portability and economy of these buildings are exactly what the oil industry demands. That's why you are *safe* when you order STURDYBILT Prefabricated buildings.

PREFABRICATED HOME MANUFACTURER 30 Years

MANUFACTURERS OF SPECIAL MILL WORK: DISTRIBUTORS OF JOHNS-MANVILLE BUILDING MATERIALS; CURTIS WOODWORK

Write for complete information concerning complete oil field camps or housing projects.

STURDYBILT

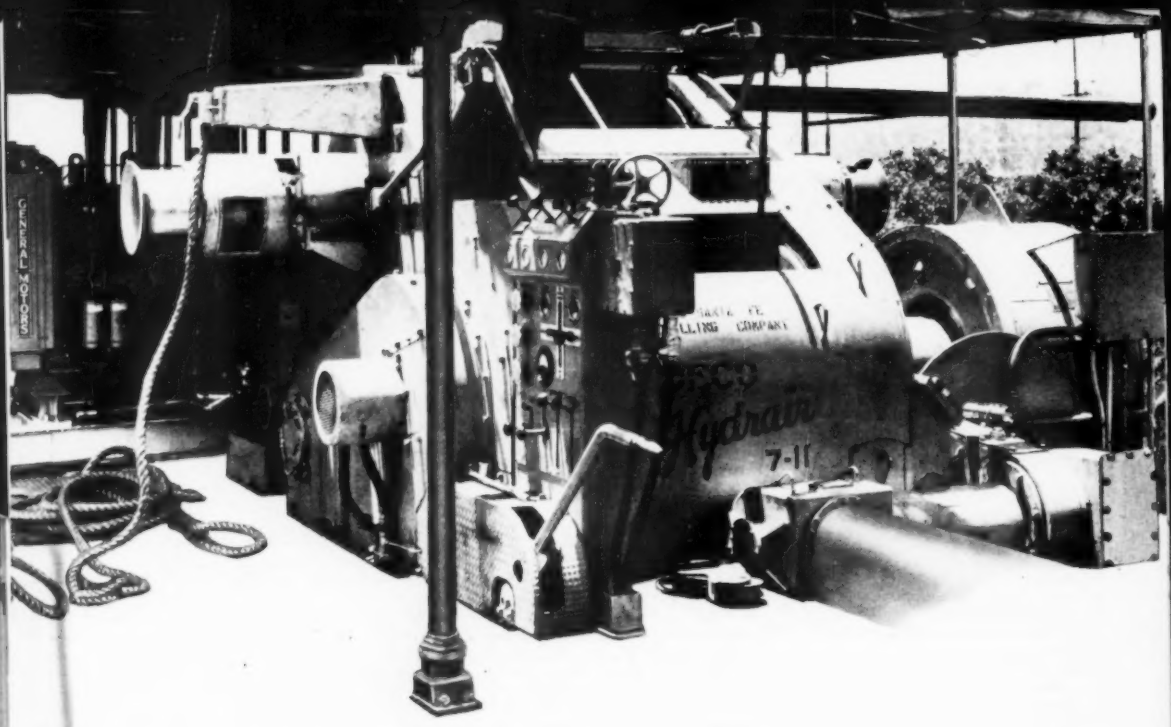
SOUTHERN MILL & MANUFACTURING CO.

Tulsa, Oklahoma

Prefabricated, Demountable Houses

PREFABRICATED HOME MANUFACTURERS' INSTITUTE phmi

STURDYBILT HOUSES COMPLY WITH COMMERCIAL STANDARD CS125-45 OF THE NATIONAL BUREAU OF STANDARDS FOR PREFABRICATED HOMES



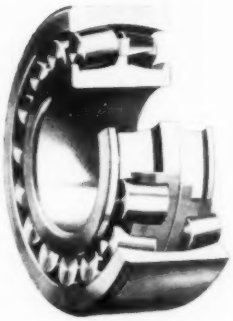
backing up a 25-ton line pull

TORRINGTON SPHERICAL ROLLER BEARINGS

In IDECO's Hydrair 7-11 Rig, heavy loads on compound, transmission, drum and cathead shafts are handled smoothly and efficiently by Torrington Spherical Roller Bearings.

The large area of roller-to-race contact is uniformly maintained and shafts turn freely even when momentary overloads cause deflection.

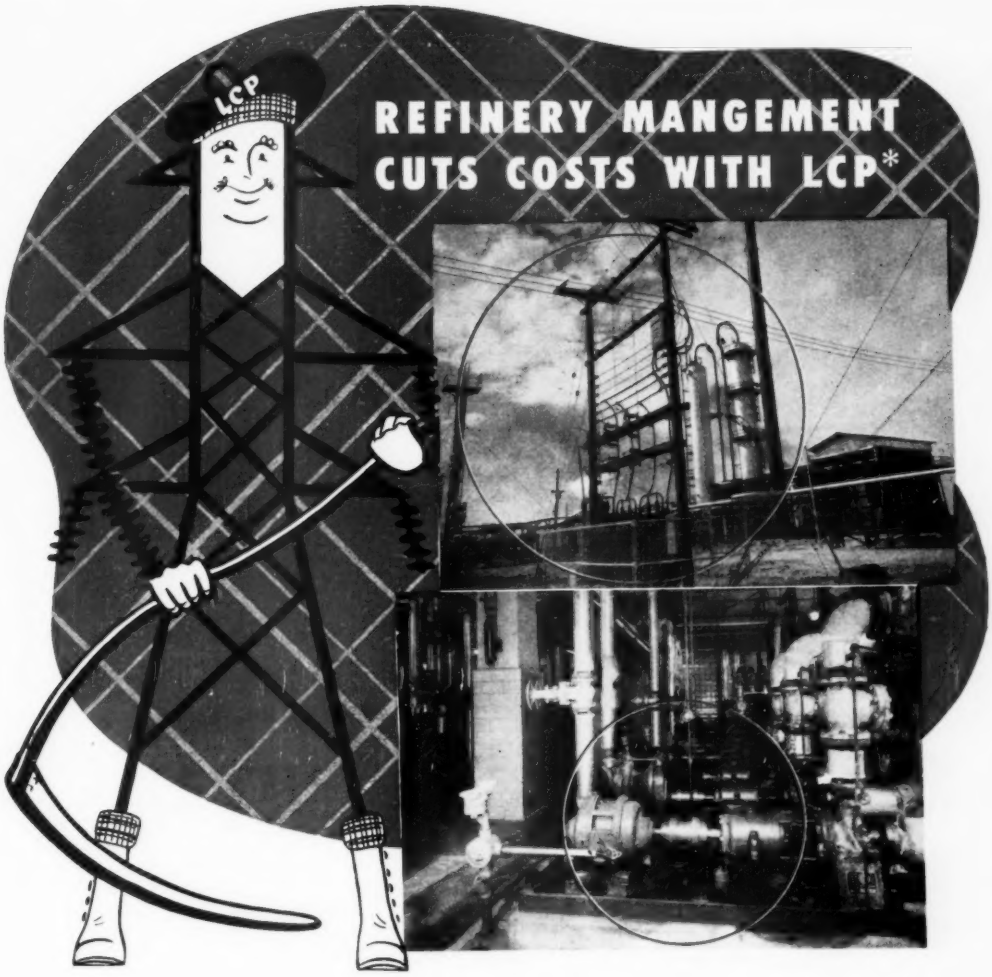
These features of heavy-duty Torrington Spherical Roller Bearings assure long service life with minimum maintenance. Our engineers will welcome an opportunity to help you secure these advantages for your product.



THE TORRINGTON COMPANY
South Bend 21, Ind. • Torrington, Conn.
District Offices and Distributors in Principal Cities of United States and Canada

TORRINGTON *SPHERICAL ROLLER* **BEARINGS**

SPHERICAL ROLLER · TAPERED ROLLER · STRAIGHT ROLLER · NEEDLE · BALL · NEEDLE ROLLERS



MORE and MORE REFINERIES USE *LCP EVERY DAY!

Always on the job—that's me! And with refiners that's what counts! No costly shut-down time when I'm delivering my constant, trouble-free service! I can take on a 24-hour shift or work according to any fractional time schedule. Automatic control does the trick—and saves you money on maintenance and labor. The Power Engineer of your Utility Electric Power Company has files galore on successful power conversions. Get the facts from him!

*LOW COST POWER

PETROLEUM ELECTRIC POWER ASSOCIATION

EXTRA YEARS of pipe life HERE

The longer the coating and wrapping stays positively bonded to your pipe... then the longer your pipe will resist every corrosive agent and operate free of costly leaks.

20" steel pipe, with Hill, Hubbell mill-*applied coating and wrapping, being laid in rugged Rocky Mountain terrain.*

thanks to the pipe protection process that includes VITAL WARM-UP HERE

NO MOISTURE between pipe, primer, and succeeding coatings can endanger the effectiveness of Hill, Hubbell-applied protection. This is because Hill, Hubbell insists that all pipe pass through huge heating and drying rooms (*above*) before Roto-Grit-Blast cleaning and other processing. The pipe is pre-heated to 90°, drying off every trace of moisture. Then this temperature is *constantly maintained* until the entire coating and wrapping process is completed. This vital "warm-up" step is just one more reason why Hill, Hubbell *factory*-applied protection assures you far longer pipe life.

When You're at the Convention... Say Hello!

Hill, Hubbell Booth No. 57

NACE • ST. LOUIS • APRIL 4-7

Milt Bowen and gang

Hill, Hubbell and Company

Division of GENERAL PAINT CORPORATION

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Uncle Sandy SAYS

"Those sheaves sure look good to me," a customer tells W. H. (Dub) Welsh, manager of United's Pauls Valley Store.

"Good folks to know"

UNIVERSAL

The line of Universal Products that United carries is proof that United Folks are good folks to know: they can supply you with the best products and they can keep you informed on new and improved equipment which saves you time and money. Take, for instance, the line of Universal drilling equipment: crown blocks, traveling blocks, swivels, rotary tables and slush pumps. Universal blocks have big 50-inch sheaves with double-row tapered roller bearings mounted on 13-inch pins — these sheaves have greater load-carrying capacities without increase in size. The Universal traveling block is heavy and compact . . . falls straight and fast. String running, or pulling, is faster with a Universal block. Before your next rig-up for deep drilling, ask about Universal at your United Supply Store.

Courtesy
Service
Dependability

UNITED SUPPLY
AND *Manufacturing* COMPANY
TULSA, OKLAHOMA
Stores in Kansas, Oklahoma, Texas, Louisiana, and New Mexico

NOW...A SAFER TORPEDO SERVICE WITH DU PONT SPECIAL OIL WELL EXPLOSIVE NO. 1

New easy-to-load cartridges sharply cut clean-out time and expense

INCREASED SAFETY: American Glycerin Section's improved torpedo service greatly reduces risk of equipment damage or injury to personnel . . . through the use of Du Pont S.O.W.E. #1. This newly developed explosive contains no nitroglycerin . . . thus the danger of premature explosions is greatly reduced.

INCREASED EFFICIENCY: Extensively tested in many fields and under all conditions for which it is designed, S.O.W.E. #1 proves superior for increasing oil production. Dependable, too—because its blasting action is unaffected by variations in hydrostatic pressure or by penetration of well fluids.

REDUCED OVER-ALL COST: Du Pont Special Oil Well Explosive No. 1 gives a powerful "spreading action" blast of greater fracturing range, opening up the toughest, densest strata and promoting much greater flow of oil. Local rock pulverization is kept to a minimum, reducing clean-out time and expense.

Your American Glycerin Section representative will be glad to tell you more about the advantages of Du Pont Special Oil Well Explosive No. 1 for shooting wells.

AMERICAN GLYCERIN SECTION

Explosives Department

E. I. du Pont de Nemours & Co. (Inc.), Tulsa 3, Oklahoma

ECONOMICAL TO USE

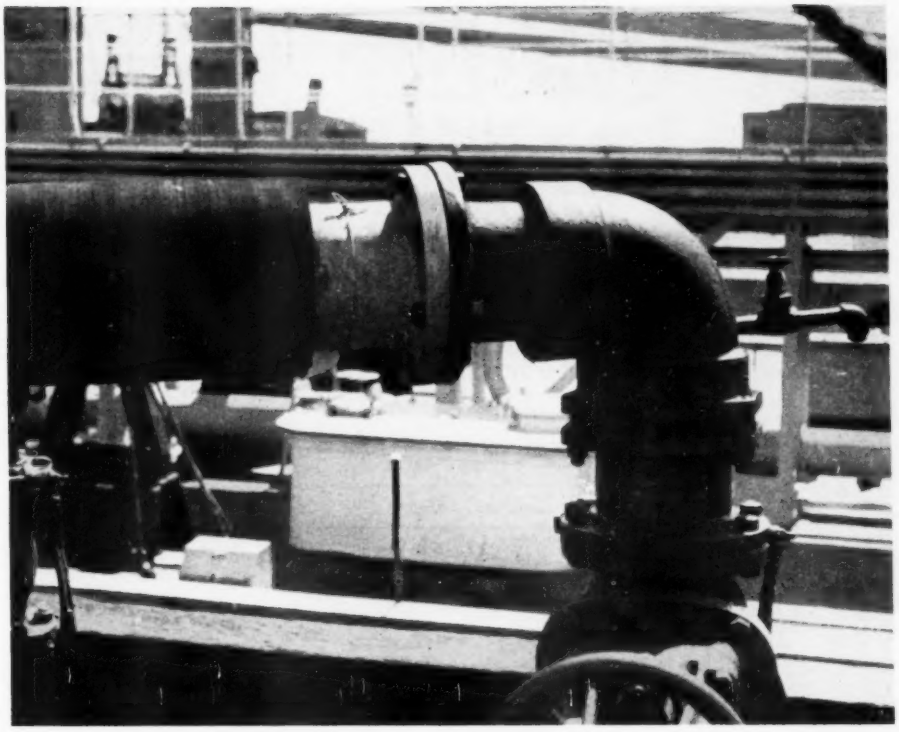
Du Pont Special Oil Well Explosive No. 1 costs no more than other explosives. Operators who try it continue to use it, and find that its value lies in greater economies through increased safety... reduced clean-out costs... and greater production.

DU PONT

REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING

. . . THROUGH CHEMISTRY



making the hose that feeds the tanker . . .

is a job best done by Republic Rubber

THROUGH the smooth bore of Republic's Dock Loading Hose slide millions of barrels of petroleum going in and out of the ships that carry it to distribution points all over the world.

Shown above is a section of Champion Smooth Bore Dock Loading Hose with a built-in aluminum nipple. This combination is light, easy to handle; it's safe, and it's tough for both high pressure and suction pumping.

The hose has a special Reprene oil-resisting cover, specially compounded to resist abrasion from concrete docks and the sides of vessels. And it won't crack or craze under the sunlight!

The corrosion-resistant aluminum nipple is vulcanized into the hose, eliminating the use of any external bands or clamps which might interfere with easy handling. The aluminum is light and strong, and it will never cause dangerous sparks. Explosions are further prevented by a special ground wire that runs the entire length of the hose.

Republic Rubber has been serving the Oil and Gas Industry for more than 48 years.

Republic Rubber is *the* specialist in mechanical rubber goods. Consult your distributor today or write Republic Rubber for specific information.

Pioneers in the use of COLD RUBBER

REPUBLIC RUBBER DIVISION

LEE RUBBER & TIRE CORPORATION, YOUNGSTOWN, OHIO

Lee Deluxe Tires & Tubes · · Conshohocken, Pa.

MECHANICAL RUBBER GOODS BY

REPUBLIC RUBBER DIVISION

GLOBE

Offers You a Wide Choice in Stainless Steel Tubes

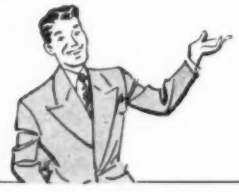
GLOBE *Seamless* STAINLESS STEEL TUBES

GLOWELD *Welded* STAINLESS STEEL TUBES

AVAILABLE IN MORE THAN 26 ANALYSES

For Your Product or Process . . . One of These Types May Offer You the Most In . . .

- Resistance to Corrosion
- Strength at High Temperatures
- Resistance to Oxidation at High Temperatures
- Ease of Fabrication



TYPICAL ANALYSES (In Per Cents)

Type No.	Chromium	Nickel	Carbon	Other Elements
301	16-18	6- 8	Over .08-.20	
302	17-19	8-10	Over .08-.20	
302B	17-19	8-10	Over .08-.20	Si 2-3
304	18-20	8-11	.08 max.	
308	19-21	10-12	.08 max.	
309	22-24	12-15	.20 max.	
309S	22-26	12-15	.08 max.	
309Cb	22-24	12-15	.10 max.	Cb 8xC min.
310	24-26	19-22	.25 max.	
314	23-26	19-22	.25 max.	Si 1.5-3
316	16-18	11-14	.08 max.	Mo 2-3
316Cb	16-18	10-14	.08 max.	Mo 2-3; Cb 8xC min.
317	18-20	11-14	.08 max.	Mo 3-4
321	17-20	9-13	.08 max.	Ti 5xC min.
329	23-28	2.5-5	.20 max.	Mo 1-2
330	14-16	33-36	.15 max.	
347	17-20	9-13	.08 max.	Cb 10 x C min.
403	11.5-13		.15 max.	
405	11.5-13.5		.08 max.	Al .10-.30
410	11.5-13.5		.15 max.	
416	12-14		.15 max.	P, S, Se min. .07 Zr, Mo max. .60
430	14-18		.12 max.	
443	18-23		.20 max.	Cu .90-1.25
446	23-30		.20 max.	N_2.10-.25
Inconel*	11-15	70 min.		Fe 10 max.
Nichrome**	20	80		

*Registered U. S. Trade-Mark. **Trade-Mark Reg. U. S. Pat. Off.-D-H Co.

CHROMIUM, nickel, carbon, manganese, silicon, molybdenum, columbium, titanium — these and other elements, combined in various percentages, are the ingredients of stainless steel. Because varying analyses have widely varying service characteristics, Globe recommends a specific analysis or type only after carefully studying your particular problem. In addition to the above 26 standard types, *Globe also furnishes special analyses.*

You benefit from Globe's years of experience and research on stainless steel tubing problems. You are invited to take advantage of the extensive testing facilities in Globe's chemical, physical, and metallurgical laboratories and its staff of scientists and engineers.

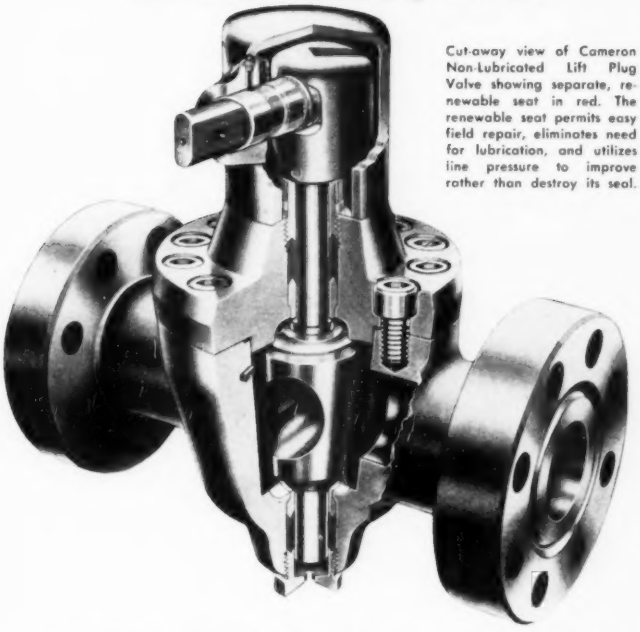
GLOBE STEEL TUBES CO., Milwaukee 4, Wisconsin

Write for Bulletin 301 — Corrosion and Heat Resisting Steel Analyses Chart — a valuable reference tabulation of stainless steel analyses as produced by various manufacturers.

Seamless Stainless Steel Tubes—Gloweld Welded Stainless Steel Tubes—Carbon-Alloy-Seamless Steel Tubes — Globeiron Seamless High Purity Ingot Iron Tubes — Globe Welding Fittings

another fine advantage of the *Cameron* NON-LUBRICATED LIFT-PLUG VALVE:

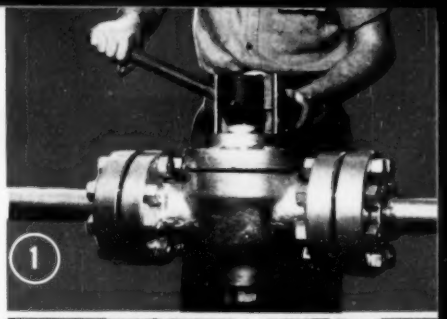
completely overhaul it in the field, without removing it from the line, and with ordinary tools!

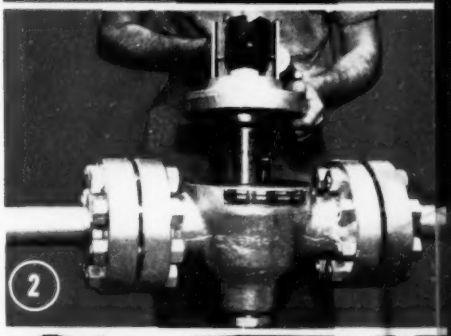


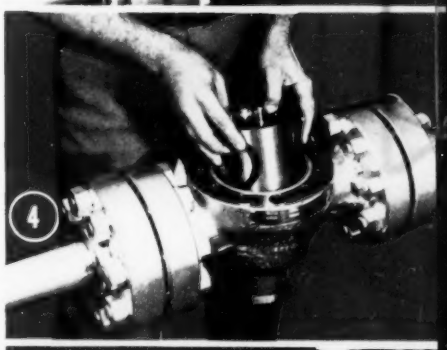
Cut-away view of Cameron Non-Lubricated Lift Plug Valve showing separate, renewable seat in red. The renewable seat permits easy field repair, eliminates need for lubrication, and utilizes line pressure to improve rather than destroy its seal.

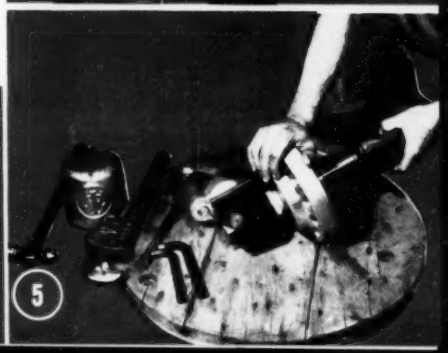
Replacement of the seat, plug or any part of a Cameron Non-Lubricated Lift-Plug Valve can be done with ordinary tools without removing the Valve from service. The photographs at right illustrate this unusual feature:

(1) With pressure off the valve and bonnet screws removed, loosen the bonnet by seating the plug. Note that the bonnet is thus lifted slightly from the valve body.
(2) The valve bonnet assembly and plug may now be lifted out of the valve body.
(3) Using a pipe wrench, the valve seat may be easily loosened from the valve body by hooking the end of the movable jaw of a wrench in a port in the seat and prying upward with the pry bar against the stationary jaw of the wrench.
(4) The seat may now be easily removed from the valve body.
(5) In order to remove the plug from the bonnet assembly, the pin which holds the operating cam to the plug stem is tapped out with a punch.









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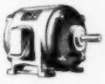

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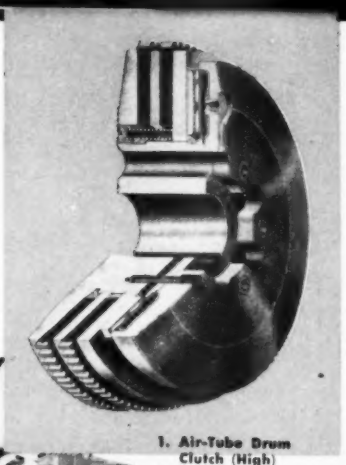

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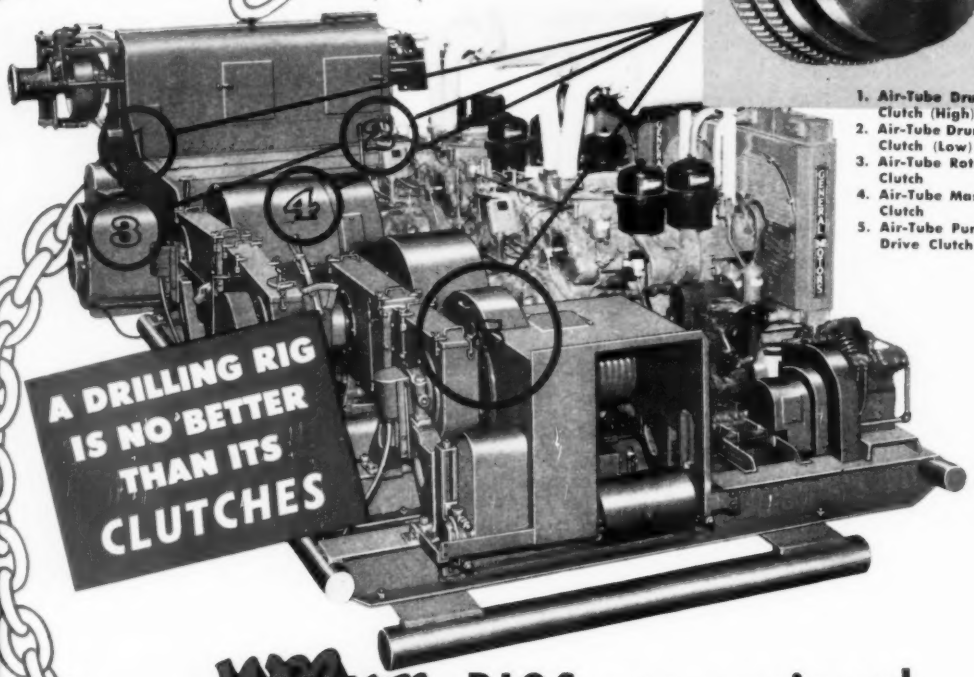

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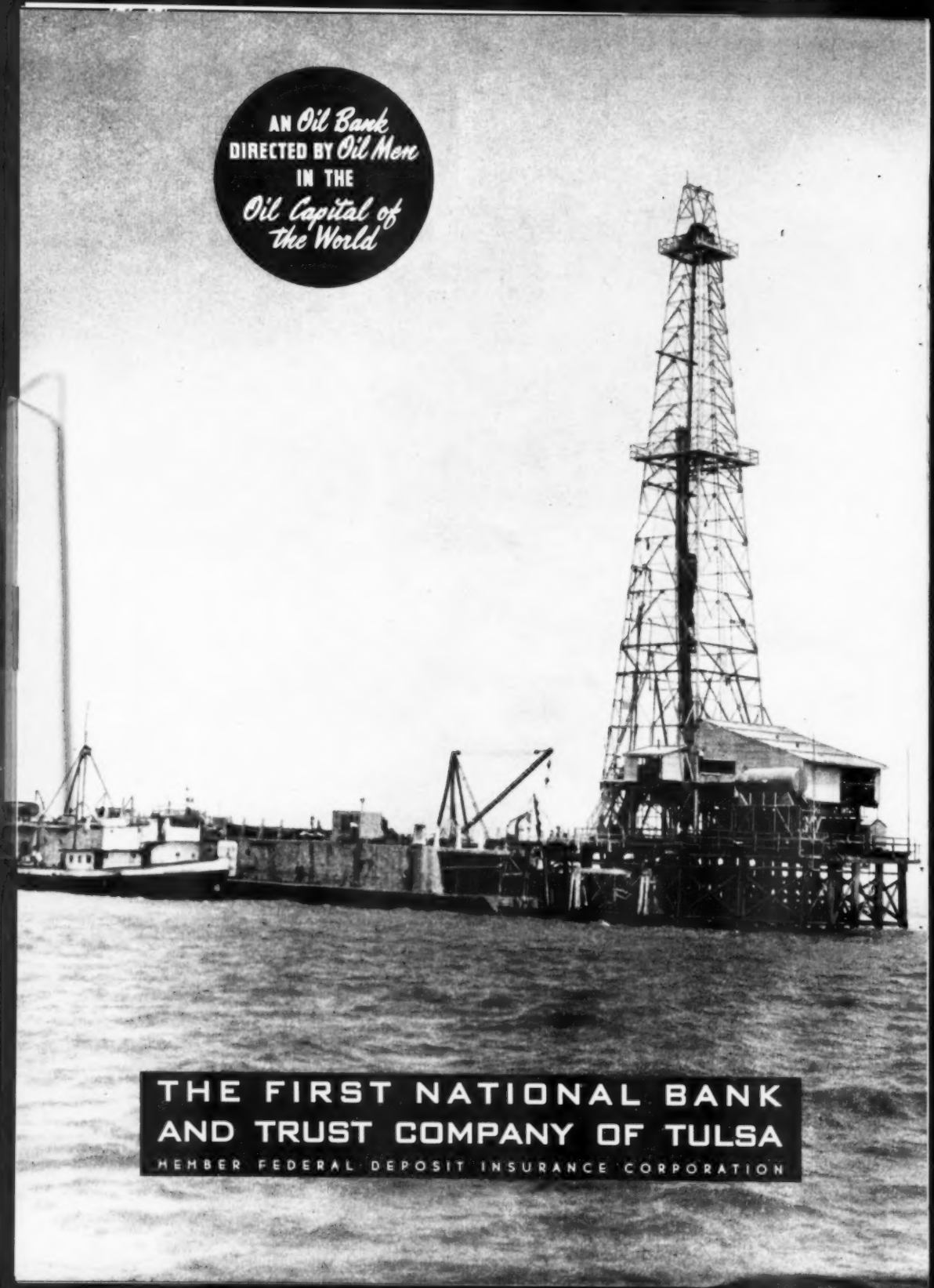
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They Say—

Shale's Future

"The present margins between the costs of discovering and exploiting new petroleum fields and preparing oil from shale are not so great as to make the latter impractical or visionary, and it can be expected that these margins will be narrowed.

"No one believes that we are suddenly going to wake up and find that we have run out of petroleum, but all can agree that in the not-too-distant future we may have to look to other supplemental sources for liquid fuels, and from the research standpoint it is only prudent that we should begin to study the problem now. . . .

"By relatively simple processes the crude shale oil can be made into acceptable bunker fuel oil which would release a corresponding amount of good refining crude for gasoline and diesel-oil production and this is probably the way in which it will first be used."

S. H. McAllister Shell Development Co. addressing the California Section of the American Chemical Society.

Federal Oil Statistics

Sir:

The Oil and Gas Journal of January 5 contains a statement to the effect that certain government agencies, including the Department of Labor, publish information for the group of industries called "Products of coal and petroleum." The statement continues: "Now, may we ask, what earthly use is a statistic on wages, or prices, or anything, which applies to the whole gamut of products of coal and petroleum?" The statement concludes that petroleum, one of our largest and most progressive industries, "is entitled to some statistics of its very own."

In most of the branches of statistical data, including wages and prices, which are covered by the Bureau of Labor Statistics of the Department of Labor, information actually is published regularly by the bureau separately for both crude petroleum and petroleum refining. Most of this information is published each month in the Monthly Labor Review and is available in more detail in various regularly published reports and special bulletins. . . .

As for wages, the bureau publishes each month figures of average hourly and weekly earnings and also of weekly hours, both for crude petroleum and natural-gas production and for petroleum refining. We include also, an industry division described as "Other petroleum and coal products." That industry, as well as the two industries which relate exclusively to petroleum, conforms to the Standard Industrial Classification as adopted by the various government agencies concerned with industrial statistics. The classification was adopted after much discussion and careful consideration of the views of industry representatives. The actual organization and manufacturing processes of the industry defined as "Other petroleum and coal products" are such as to prevent a satisfactory separation of data on a commodity basis. That industry, however, is comparatively small; the major industries, crude produc-

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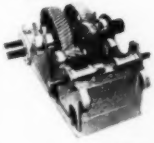

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The Pacific-Western bandwheel-drive package installation makes old wells pay by cutting operating costs to the irreducible minimum.

ON PIPELINES
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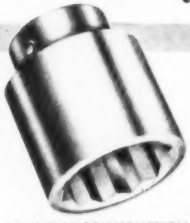

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tion and petroleum refining, are given separately.

The same classifications are observed in the publication of our employment statistics. There are two types of employment data. One type includes all employes; the other type is limited to production workers. Labor turnover figures are published separately only for petroleum refining. . . .

The bureau has also made certain special surveys of the occupational and regional wage structure of the industry. A survey of petroleum refining was made in 1948. No general survey has been made for crude petroleum production, but during the war certain limited and regional surveys were undertaken.

Only summary price statistics are published in the Monthly Labor Review. Figures in greater detail are issued periodically in separate reports. The consumers' price data appearing on page 112 of the January Review give index numbers which include certain products of the petroleum industry. Prices for petroleum fuels used for residential heating purposes are published separately each month for cities in which these fuels are important. Indexes for refined products, as fuel oil, kerosine, gasoline, and motor oil are available quarterly. The wholesale prices of fuel, as published in the Review (page 119 of the January issue), include separate data for the major fuels, including petroleum and products. Detailed weekly, monthly, and yearly figures are published in separate reports. Statistics are made available by major classes of products and by regions.

The bureau also publishes information regarding work stoppages on the basis of the Standard Industrial Classification. Those figures are compiled on an annual basis and published in summary form in the May issues of the Monthly Labor Review and in detail in an annual bulletin on work stoppages. Information regarding collective agreements, although not regularly published in the form of detailed industry breakdowns, is coded in a manner that makes possible the compiling of information on an industry basis when special need arises.

A comprehensive bulletin on the long-range employment prospects of the industry has been prepared by the bureau for general use as one of our Occupational Outlook Series. It is not yet available but is being scheduled for publication.

We are making an effort to include the petroleum industry in our productivity studies but have encountered certain difficulties in obtaining satisfactory data on a comparable nature for the basic series of production and employment data necessary for deriving current productivity estimates.

If suggestions for the further improvement of our statistical work occur to you or to any of your readers we shall be glad to give them careful consideration.

Ewan Clague,
Commissioner of Labor Statistics,
Department of Labor,
Washington

Simple Economics

"When a barrel of oil is taken out of the ground, there is a barrel less available in the well. The same holds true for every cubic foot of gas. The income left to an oil and gas producer after the depletion allowance is accounted for is treated exactly like income from any other source.

"If we want to run out of petroleum and gas in a few years, a good way to do it would be to keep chiseling away at the depletion allowance. The lower we make that allowance, the fewer will be the number of men who will want to take the risks of exploration. The result will be smaller known reserves and less oil from existing reserves.

"It's as simple as that in our kind

of economic setup. If we want to wipe out enterprise and let the Government take over the oil and gas business—well, that's another question."

Editorial in the Chicago Journal of Commerce.

Restricted Output

"American oil industry production was a million barrels a day less than capacity (in the last half of 1949), representing a cut of 17 per cent; Texas producers held production to 700,000 bbl. a day below capacity during the last half of the year.

"We did not produce it (the amount between production and capacity) because there was no market for it.

"If we had not shut down, there would have been chaos and then a complete shutdown."

Ernest O. Thompson, Texas Railroad Commission, speaking in Amarillo.

Higher Imports

"The import problem will be much more serious in 1950 than in 1949, even allowing for an announced reduction. . . .

"The 11 principal importing companies, fully taking into account all proposed cuts, will exceed their total 1948 import average by 108,000 bbl. daily, or 20 per cent.

"It is hoped when the leaders of the import segment of the oil industry take inventory of the current position, they will recognize that this problem has not been solved on a just and equitable basis, compatible with the best interests of the nation."

William J. Murray, Texas Railroad Commission, speaking in Austin.

Salt-Water Disposal

Sir:

I have seen several articles in The Oil and Gas Journal on disposal of salt water into wells. We are faced with a disposal problem and would appreciate it if you would tell us where we can get some information.

The State of Michigan has about the same formations as we have.

We have a pretty complete set of Oil and Gas Journals for about 25 years.

R. L. Pattinson,
Medina Natural Gas Co., Ltd.
Alymer, Ont., Canada.

Editor's Note: Principal references include: "Salt Water Disposal," by J. R. Hatfield and L. B. Hicks, April 14, 1949, page 114; "Circular Salt-Water Treating Unit Proves Successful," by George Weber, August 12, 1948, page 102; "Central Treating Plant Performs Dual Function," by Neil Williams, March 1, 1947, page 56; and "Salt Water Disposal in East Texas Field" (series of four articles) by W. S. Morris, August 10, 1946, page 17; August 17, page 89; August 24, page 86; and August 31, page 92.

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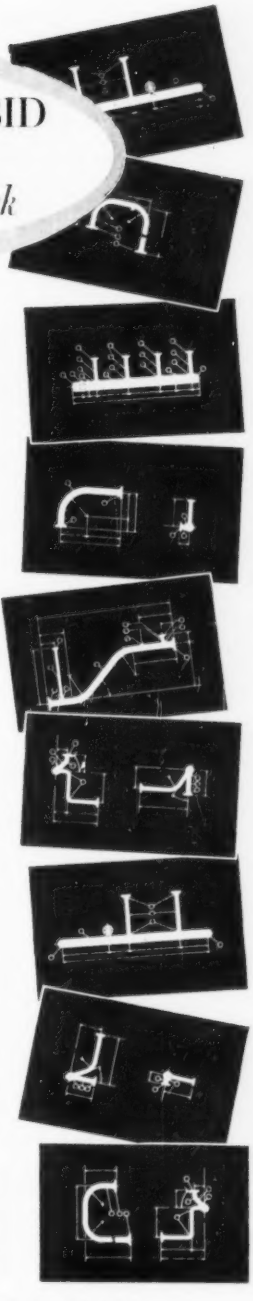

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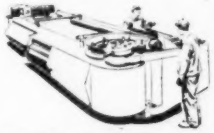

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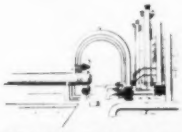

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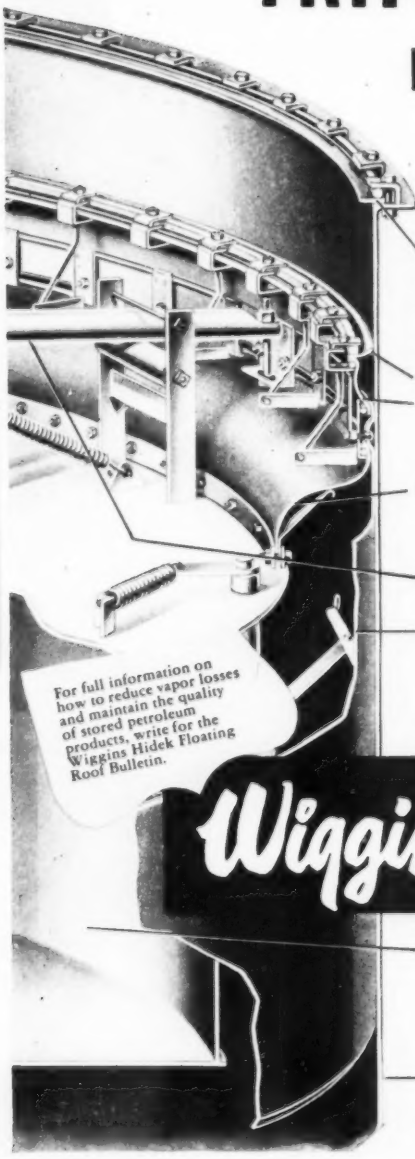

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JOURNALLY Speaking

Re Statistics

IT'S dangerous business to express a personal opinion in print.

In the January 5 issue the conductor of this column started the New Year wrong by venting a pet peeve against statisticians, particularly government statisticians, who group figures under "Products of Coal and Petroleum."

Brother, have we heard from that! We explained at the time that it was just a personal opinion and probably wasn't important anyway. We also added the presumption that it was reasonably safe to criticize the federal Government because regular editorial writers do this now and then and apparently get away with it.

How wrong we were. We have received long personal letters from the U. S. Commissioner of Labor Statistics, the Director of the Census, and statisticians within the oil industry. All say that some people like their figures grouped this way and anyone really interested can read farther down the list and get his oil figures separately.

So be it. Let the majority rule. We'll lay off the subject. Personally we still don't see much sense in grouping coal and petroleum statistics, but if we had the kind of a brain that could make sense out of statistics we would call ourself an economist and quit trying to make a living beating a typewriter.

What the Commissioner of Labor Statistics has to say about it appears in our rival department, "They Say," a couple of pages to the left of this. That department carried other views on our indiscretion in the issue of February 2.

Anyway, we are flattered by the breadth of our readership. We had supposed that people who deal with important statistics and factual data didn't waste their time reading this unfactual and nonimportant column.

Also, it seems to bear out another of our personal opinions, namely, that statisticians don't have much sense of humor. Maybe we shouldn't have made that crack. It might bring down another flood of correspondence on our head.

Scurry Scoop

OUR favorite oil publication has been printing so much stuff on Scurry County lately that we almost overlooked Charley Deegan's brag in his "Exploration and Drilling" column February 23.

Charley claims credit for himself for the world's greatest scoop—by printing a story 9 months after the event. We've heard of a lot of journalistic scoops, but never one like that. In newspaperman's language a scoop is a story rushed into print almost simultaneously with the happening. But, being a geologist, Charley probably is accustomed to thinking in terms of geological time. We will grant that with geologists, 9 months is pretty fast for anything to happen.

But far be it from us to belittle the achievement of "Scoop" Deegan (as he is now known) in recognizing that a little old reef out in West Texas was the greatest oil strike in two decades, and in being the first to tell the world about it. Things like that are Charley's stock in trade, and he doesn't miss many of them. His weekly comments on hot wildcat areas have called the turn on many a drilling and leasing play.

True to Charley's predictions, Scurry County has become the biggest active field—and the biggest oil news—in the country. That's why this publication prints so much about it.

Charley's scoop has been followed by many reports, appearing in various sections of this magazine, written by our own staff men and based on first-hand information on the Scurry play. And, being a weekly, we could satisfy the industry's need for current, as well as accurate, news.

After Charley tipped us off it didn't take the rest of the staff any 9 months to follow up with a whole series of Scurry scoops.

—*Henry D. Ralph*

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The OIL AND GAS JOURNAL

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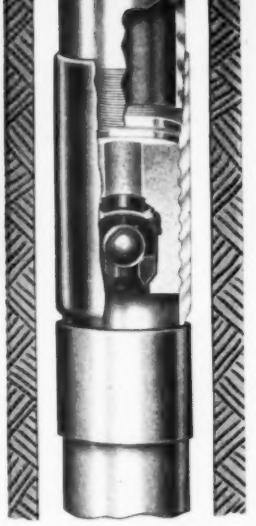

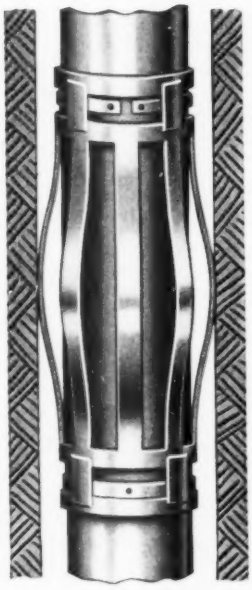

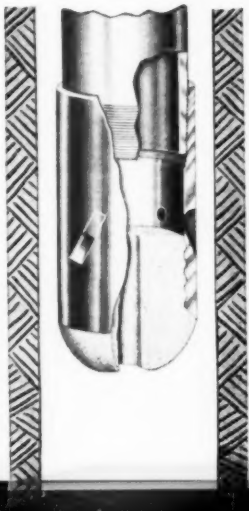

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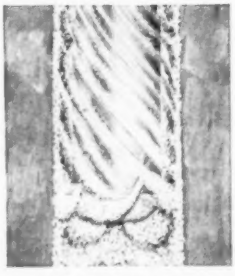
The downward hydrualicking action of the circulating fluid through the baffled side down-whirler ports and the restricted bottom passageway, effectively remove bridges and permits safe running of the string of casing.

When washing the formation at the cementing point to condition the hole, the "whirling" motion of the fluid helps remove mud cake from side walls. This *downward* whirling is far superior to any *side jetting* action, and does not cause caving or crumbling of soft formations.



The "whirling" motion given to the cement slurry as it is discharged from a Baker Wash-Down Whirler Shoe causes the cement to encase the centered shoe joint with a more uniform body of cement, and reduces to a minimum the hazard of channeling.

A Crucial Month

Veteran petroleum observers are wont to consider March the key month of the year marketwise. Over the years there has been considerable evidence to support their contention.

March marks the month in which the domestic industry emerges from a winter period in which demands for heavy fuels and distillates are a major factor in operations. The season of maximum gasoline consumption starts and this fact in turn becomes controlling in trends for several months.

Too often in the past a March statistical checkup has revealed a lack of balance needed to assure sound markets over the remainder of the year. Fortunately, there was still time to correct maladjustments if operators were willing to take the required actions.

In the present situation the immediate responsibility rests with refiners and the operators of natural-gasoline and cycling plants. Substantial reductions have been made in crude oil stocks in recent months, but this improvement has not included most products—notably gasoline.

Obviously a detailed discussion of the industry's current statistical position and outlook should be divided between the West Coast and the remainder of the United States. California refiners, with the largest accumulations of stock of any area, have their own problem. It is of general significance only when it results in distress supplies being disposed of outside their normal marketing areas.

East of California, considered as a unit, gasoline inventories are excessive for this time of the year and with that background current production also exceeds needs.

The excuse that high refinery runs to stills are necessary in order to take care of consumption of all grades of fuels no longer holds. In fact, in the light of the coal-strike settlement and the rapid expansion in natural-gas sales, it is desirable that inventories of distillate be reduced substantially in some areas before the summer accumulation starts.

While higher percentages have been suggested, it is apparent that a reduction in projected refinery runs of around 5 per cent, if generally adopted, would bring gasoline stocks to a healthy level by May 1.

A special situation exists in the case of natural gasoline and cycling products, the production of which is up substantially over that of a year ago. This includes production of more than 50,000 bbl. daily of motor fuel, which happens to be the weakest point in gasoline markets at this time. The solution lies in the absorption of this output by refiners and its disposal in normal market channels.

Some will point out that there are current problems other than those concerned with refinery processing levels. That is true. But the manufacturing ends of the oil business have the immediate duty of establishing the over-all operating levels as an industrial yardstick.

THIS WEEK

SCURRY—Activity leveling off with 187 rigs operating, but reef play in adjacent counties still increasing. . . . New pipe lines, gasoline plants under construction to handle flush production. . . . Operators say 8-day shutdown order will be met without loss of crude output. . . .

INTERNATIONAL—Hoffman tells House ECA will not finance European refinery construction where not "justified." . . . Says England will get no more funds if dollar-oil ban continues. . . . ¶French Government already reporting refinery output exceeding demand. . . . ¶Import question of I.P.C.'s Qatar offshore rights now being considered by arbitration panel. . . . ¶Shell, Standard to halt exploratory work in Ecuador after spending $40,000,000 without finding oil. . . . ¶Venezuela asks production cut, sends emissaries to U. S. in effort to preclude serious restrictions on imports by this country. . . .

TECHNOLOGY—Combination rotary and percussion drill being tested by California inventor. . . . Test model shows excellent results in laboratory granite-drilling experiments. . . . ¶Bassinger-Shell rotary-percussion drill may go into service-company operation soon to drill chert in West Texas. . . . ¶How sound can collect minute particles from process-operation exhaust gases in refineries is described before Houston A.I.Ch.E. meeting. . . . ¶New natural-gas storage method to be demonstrated next week. . . . Involves adsorption of refrigerated gas by fuller's earth material. . . .

ECONOMICS—Drop in natural-gasoline price focuses attention on recycle problem and possible effects on product, crude prices. . . . ¶Bureau of Mines figures show December total product demand set all-time record, in spite of dropping exports. . . .

TRENDS—Current data indicate that daily average refinery demand for gasoline in first 8 weeks this year was almost 4 per cent greater than actual refinery demand in January and February 1949. . . . Kerosine was up about 8 per cent and distillate increased 6 per cent. . . . Refinery demand for residual was about the same as last year but total demand was probably greater because of imports. . . .

ACTIVITY—Daily average crude production for week ended March 4 decreased 70,375 bbl. to 4,848,975 bbl. . . . ¶Total well completions increased 33 to 677 wells. . . . Wildcat completions were down 4 wells to 116. . . . ¶There were 1,927 rotary rigs operating in United States on February 27, up 46 rigs from previous week but 59 rigs less than on same date last year. . . .

INDUSTRY AFFAIRS—Frontier Oil Refining Corp. bought by Ashland Oil & Refining Co. . . . Purchase brings Ashland's refining capacity to 77,000 bbl. daily. . . . Oil companies this spring to market house brands of automatic-transmission fluids for first time. . . . A.P.I. Production Division breaks down research program to place most projects on local level. . . .

GOVERNMENT—Texas oil taxes go up 10 per cent as bill increasing omnibus bill rate is signed into law. . . . Observers estimate oil's tax bill will be increased more than $12,000,000 during next 18 months. . . . ¶Congressional committee hears U. S. tanker fleet is being beached by shift of world's oil center to Middle East and by lower operating costs of foreign vessels. . . . British-American oil talks recessed again as British participants return to London. . . . Discussions still stalemated.

NO CHANGE.—The synthetic-rubber industry, typified by this butadiene plant at Lake Charles, La., should go along for another 3 years under the same type of control it now has. This was the decision last week of the House armed services committee, which threw out President Truman's 10-year plan for disposal of the plants. The committee felt that the present control plan is adequate, that the President was asking too much power for too long, and that the Government would not be able to sell the plants under the rigid restrictions it planned. Both rubber and oil interests agreed. The plant shown here is located adjacent to the Cities Service Oil Co. refinery at Lake Charles and is operated by Cities Service.

Recycle Gasoline

Drop in natural-gasoline prices may boost production of recycle, increasing its competition with refinery product

RECENT sharp declines in the prices of natural gasoline and heavy production of recycle gasoline focus attention on the influence these products have on the market structure of the entire oil industry.

These natural-gas liquids are the most vulnerable petroleum products from the standpoint of fluctuations in demand and price. Though their total output is about 8 per cent of all petroleum products, they exert a disproportionate influence on motor-fuel prices because of the conditions under which they are marketed.

Some people in the oil industry hold the view that the current situation in natural and recycle gasoline is more of threat to the price structure of crude and petroleum products than imports of foreign crude. They have suggested that their production be regulated along with crude by state conservation authorities *(see The Oil and Gas Journal, March 2, page 11)*.

While the current price drop is partially seasonal, there are other, more long-range, factors. These include the recent large increases in producing capacity, the race for higher-octane motor fuels, the shift in method of rating octane numbers, and the softening of filling-station prices for gasoline in some areas.

Recycle.—Recycle gasoline is similar to natural gasoline in that it is produced in gasoline plants in the oil fields rather than in refineries. It differs in that it is marketed as a finished motor fuel whereas natural gasoline is used only as a blending stock for motor fuel. Its production, not confined entirely to strictly cycling plants, is concentrated in northern and eastern Texas and northern Louisiana.

Production of finished motor fuel and naphthas by natural-gasoline and cycling plants has almost doubled since 1945. Plant output of these products averaged 43,300 bbl. daily in 1949, an increase of 26 per cent over 1948 and 99 per cent over production in 1945.

Gasoline produced from crude petroleum gained 4 per cent from 1943 to 1949 and 21 per cent in the period 1945-49. In other words, the percentage gain in production of finished gasoline at natural-gasoline and cycling plants was greater for the 1-year period than the gain in refinery-produced gasoline for the 4-year period.

Plant production of finished gasoline in December averaged about 54,000 bbl. daily, or enough to supply about 2 per cent of our total demand for gasoline. However, the importance or influence of this production is greater than the ratio to total demand since production is confined to a relatively small area.

No tabulated data are available on the distribution of this gasoline but is known that most of it competes directly with refinery-produced gasoline in the Group 3 (Mid-Continent) spot market. At times it accounts for most of the spot sales in this market. Some moves by tank car to northern demand areas but a large portion is barged up the Mississippi at cheaper water rates. Actual transportation costs are often much less than for shipments out of Oklahoma and Kansas refineries.

Octane problem.—Recycle gasoline dropped from a "quality fuel" to "regular grade" with the shift to the research method for determining octane ratings. In the early stages of the changeover, most gasoline was sold on specifications quoting octane rating on the A.S.T.M. motor method but with added information giving the number of points "jump" between motor and research ratings.

It was in this period that suppliers were stressing the amount of this "jump" or sensitivity as a measurement of quality. Some gasolines were sold on a basis of a 5-point or 10-point jump. Since recycle had less than 2 points and in some cases actually showed a negative jump, it lost some of the better markets to refinery-produced gasoline. Group 3 prices for recycle range about 1½ cents below the "low" for the refinery-produced regular.

The changes that have taken place in production and distribution of recycle gasoline are just parts of the over-all problem of producing and marketing light products from natural-gasoline and cycling plants.

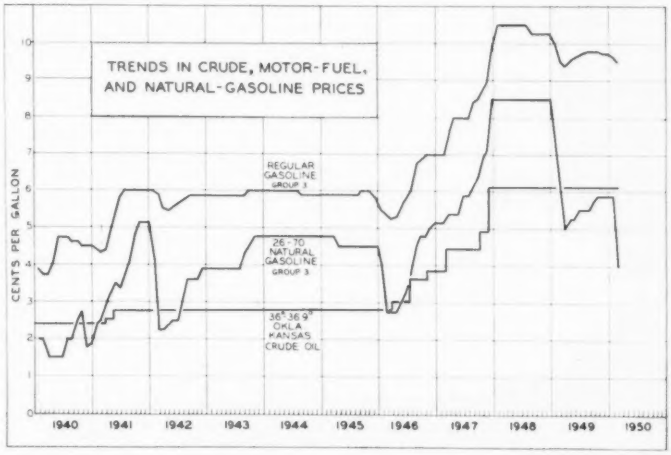
Demands for some of the natural-gas-liquid products are highly seasonal. Storage is costly. Transportation in the past has been principally by rail or barge with relatively small quantities moving by tanker or pipe line.

Production is linked with crude production and conservation, with very little consideration given to market demand for the products. Violent fluctuations in market prices indicate that some of the major producers have not made provisions for orderly distribution through their own market organizations.

Price drop.—Changes in Group 3 prices for Grade 26-70 natural gasoline indicate the effect of relatively small surpluses. The decided price drops in the early months of 1942, 1946, 1949, and again this year were accompanied by only slight decreases in the price for regular gasoline and no declines in the price of crude.

For the past year, Grade 26-70 natural has been selling for less than 36-36.9° - gravity Oklahoma - Kansas crude, and since the last price drop it has been $0.89 per barrel cheaper than this crude.

Today some natural gasoline is moving to refineries through crude lines and smaller amounts are transported in products lines but, in the past, high-cost rail transportation was a limiting factor in the demand for



blending at all refineries except those near the point of natural production.

Use of natural was also limited by the permissible vapor pressure of the finished gasoline. The present scramble for higher-octane gasolines and the shift to the research method for determining these octane numbers added still another limiting factor in the use of natural for blending.

Clear natural gasoline, having 0-2 points sensitivity or jump and a relatively low octane number, tends to lower the research number of blends containing larger quantities of natural. Since this is true, many refineries are controlling volatility of finished gasoline through the use of refinery-produced polymer gasolines which have a higher octane number and better sensitivity.

Outlook.—The octane race has had the effect of focusing attention on the natural-gasoline problem, and this attention may bring a solution.

Low natural-gasoline prices tend to increase natural and cycle-plant production of finished gasoline and, at the present, this gasoline is in the price-cutting market. Many operators believe that both natural and plant-produced finished gasoline can be improved by a reforming operation. The record spread between natural and finished-gasoline prices may give an added push to the development work that is being done in this field.

The location of the necessary processing equipment may depend on the solution of the transportation problem. If larger and larger quantities of natural gasoline are turned into crude lines, reforming may be done at the refineries. In other cases, where the output at a plant or in an area is large, the necessary units may be constructed at plants.

No one at present has a cure-all solution for the problems in the production and distribution of natural-gas liquids, but the men who are close to these problems feel that something must be done to stabilize this section of the industry that accounts for almost 8 per cent of total liquid-hydrocarbon production.

New Record in Demand

Pessimism in the oil industry got a jolt this week in publication of Bureau of Mines figures showing that the total demand for all petroleum products in the United States during December was the highest in history.

During December primary distributors shipped out an average of 6,948,000 bbl. per day, including exports. That is the highest demand figure for any month on record. The previous record high was set in December 1947, when total demand was 6,673,000 bbl. daily. The new record exceeds that by 4.1 per cent.

With exports on a declining trend the picture for domestic demand is even brighter. During December 1949 the domestic demand was 6,679,000 bbl. daily—again an all-time record. That is 6.2 per cent higher than the previous record, which was set exactly a year earlier—December 1948—at 6,307,000 bbl. daily.

In only 5 other months in history has domestic demand averaged more than 6,000,000 bbl. daily—December 1947, Janury 1948, December 1948, January 1949, and November 1949. But the December 1949 figure of 6,679,000 bbl. daily far outclasses any of them.

Limited Optimism

Herold lists taxes, imports, excess producing capacity as liabilities, but sees continued expansion in oil industry

Dahl M. Duff

NEW YORK.—Despite uncertainties created by shrinking foreign markets, heavier taxes, and a world surplus of oil, the American petroleum industry has a number of favorable factors to its credit which make for a more improved outlook.

Elements on both the "assets and liabilities" sides of the petroleum industry were discussed here last week by John S. Herold, New York consulting geologist and economist, in a talk at the National Federation of Financial Analysts Societies.

Liabilities.—Among the unfavorable factors, Herold listed the world's greatly expanded capacity to produce crude oil. "In the case of an individual company this is regarded as an important asset," he said, "but in the case of the industry and particularly at present, I think it is a liability. It creates a surplus of crude and products, bringing about a weakening in the entire price structure and shrinkage in oil-company earnings."

Another cause for concern is the possible impact of imports on the domestic crude-price structure, Herold said. "While the importing companies have a very large stake in the industry right here at home, we must not for this reason credit them with the power to calculate precisely just how much they can burden the domestic market short of cracking the price structure. A miscalculation can easily be made."

Increasing taxation also was listed as a liability likely to remain for a long time to come.

"In terms of domestic crude production this is equivalent to about $1.60 per barrel."

Assets.—Turning to the favorable considerations, Herold named first the prospect of an expanding domestic market for petroleum products. A second factor is "the vigor and enterprise of the American oil industry and its flexibility and response to changing conditions."

"An expanding supply of sweet crude is another asset of the industry," Herold said. "It provides a premium charging stock for refinery operations and permits a greater recovery of profitable products at lower cost. . . . There is no shortage of areas in which to look for oil. The Cuyama Valley (California) discoveries are in a region whose possibilities were clearly recognized and published in 1915. . . . The Scurry (Texas) field, embracing over 60,000 acres, is in a county which the industry has been probing with fluctuating interest and effort over the past 30 years."

Gas vs. oil.—Federal policy is the chief factor in competition between oil and natural gas, the meeting was told by Edward Falck, consultant of Washington, D. C.

Because the Federal Power Commission rigidly adheres to the cost basis of regulation in fixing the field price of gas produced by transmission companies, the household price of gas in many regions is less than the current prices of fuel oil on the basis of heat values, and this may be the case in New England and other areas scheduled for early service with natural gas, Falck declared.

"Natural gas may not encroach so much upon existing markets for heating oils, but it will obviously be an important competitor for all potential new business," he said.

"This situation, which is fundamentally due to the wide disparity between oil and gas prices, can be resolved only by a decline in oil prices, an increase in natural-gas prices, or a combination of both. The solution should be found through the normal play of free competition. The only alternative would be governmental allocation of the markets."

Pending proposals to amend the Natural Gas Act, Falck said, would remedy the situation if transmission companies divest themselves of their gas holdings and purchase all gas from independents at higher field prices. But, he continued, it is just as uneconomic to break up an integrated gas company as to break up an integrated oil company.

Falck's conclusion was that if Congress and the FPC will adopt a more realistic method of valuing natural gas at the point of production it will go a long way to reduce the abnormal severity of the present competition between gas and oil, and that under fair competition these prices will come to a balance in consuming markets.

Drilling Development

Test model of rotary-percussion drill, designed for use in hard formations, found successful in shop experiments

Kenneth B. Barnes

SUCCESSFUL combination of rotary and percussion drilling may result from experiments now being conducted by Miles J. Lewis of Long Beach, Calif., an inventor of several other drilling tools.

A test model has shown excellent results in drilling granite blocks in a laboratory, and patents have been applied for. But further improvements will be made before the device is given commercial application.

A conventional rock bit, turned by the drill pipe, is pounded against the bottom of the hole by a motor built into the drill unit. The motor is run by the flow of the drilling mud. Unbalanced flywheels produce the up-and-down motion of the bit.

Experiments with combination rotary and percussion drills are not new. It has been felt that a workable combination of the two principles might cut drilling costs by making hole faster in hard formations. Lewis' device differs from other percussion-type drills now undergoing field tests *(see The Oil and Gas Journal, November 10, 1949, page 305, and March 17, 1949, page 182)*.

How it works.—The major problem in getting a "churn effect" is to obtain the vertical percussions. The Lewis drill does this by the centrifugal force of unbalanced flywheels.

Inside the drill chamber, just above the bit, is a mud-fluid motor of the positive-displacement type. Lewis first tried a mud turbine, but found the vane-type motor more effective in the limited space available. The motor turns trains of gears connected with the unbalanced flywheels. The flywheels are so arranged that the weights neutralize each other in one direction but act cumulatively in the other direction.

The experimental model uses 24 of these unbalanced flywheels, and the combined eccentric force lifts the entire drill chamber and hurls the bit against the bottom of the hole in a succession of rapid blows. The chamber is attached to regular drill pipe with a splined joint which permits the vertical motion at the same time the entire string is being rotated by the drilling rig.

Shop trials.—In his Long Beach machine shop, Lewis set up a 3-ft. cube of solid granite. Using a completely dulled 10-in. rock bit, a hole was drilled in the granite at the rate of 5 in. per hour.

On the same setup, using a dulled 6-in. rock bit, the drilling progress was 15 to 16 in. per hour. In another run on the granite, a plain 20-in. pipe nipple was used as a core barrel. A big core of the granite was cut out.

On another test, Lewis simply set the model up to drill a hole in the concrete floor of his shop. This time no drill was employed, but simply a flat steel plate was attached to the tool-joint bottom of the percussion drill unit. A rapid fracturing and shattering of the concrete was obtained, with the pulverized concrete pieces being washed away by the power fluid.

Background.—Lewis started his drilling work on the derrick floors of rigs in Signal Hill and Huntington Beach, California, back in the early 1920's. Then he went to the Far East, working as driller for Burmah Oil Co. He continually was experimenting with drilling improvements, particularly in developing equipment for well bore surveying and directional drilling. A number of new and worthwhile tools resulted.

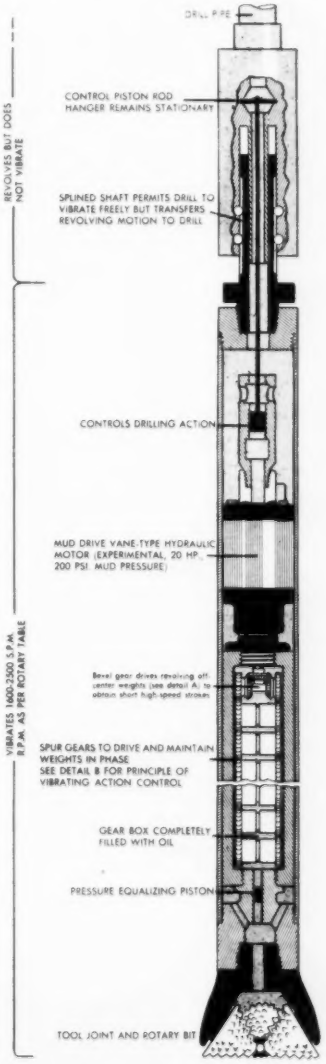
More "jar" needed.—Lewis is not yet satisfied with the present status of his percussion drill although 2½ years of study and more than $25,000 have been spent in the effort. He says the next problem, from practical aspects of more rapid drilling in chert and other hard formations, is to obtain more "unbalanced forces" for the percussion effect. A move in this direction is being made now with the substitution of tungsten instead of the bronze material (density difference 2.1 to 1) which currently serves as the "heavy" side of the series of unbalanced flywheels. Another move is to increase the number of flywheel units.

Drawings showing operating principles of the California-developed rotary-percussion drill.

Bassinger Drill Ready

HOUSTON.—Development work on the Bassinger-Shell rotary percussion drill (see references on this page for previous articles) has reached the point where the tool soon may go into service-company operation.

The Bassinger drill is scheduled to start drilling a well for Magnolia Petroleum Co. in the near future in Pegasus field, Upton County, West Tex-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CONTROL PISTON ROD HANGER REMAINS STATIONARY
REVOLVES BUT DOES NOT VIBRATE
SPLINED SHAFT PERMITS DRILL TO VIBRATE FREELY BUT TRANSFERS REVOLVING MOTION TO DRILL
CONTROLS DRILLING ACTION
MUD DRIVE VANE-TYPE HYDRAULIC MOTOR (EXPERIMENTAL, 20 HP. 200 PSI. MUD PRESSURE)
VIBRATES 1600-2500 S.P.M. R.P.M. AS PER ROTARY TABLE
Bevel gear drives revolving off-center weights (see detail A) to obtain short high-speed strokes
SPUR GEARS TO DRIVE AND MAINTAIN WEIGHTS IN PHASE SEE DETAIL B FOR PRINCIPLE OF VIBRATING ACTION CONTROL
GEAR BOX COMPLETELY FILLED WITH OIL
PRESSURE EQUALIZING PISTON
TOOL JOINT AND ROTARY BIT

as. Magnolia has eight rigs running at Pegasus, which has a 700-ft. chert section in the Devonian. Depth of the productive Ellenburger formation is approximately 12,800 ft. Well costs in this area are reported to average about $350,000.

Southwest Research Institute during the past year has carried on further development of the drill. Previously Shell Oil Co., Houston, had done much shop and field testing in West Texas and southern Oklahoma on the drill with the inventor, Ross Bassinger, of New Brunfels, Tex.

Bassinger is now forming a service company to be known as Bassinger Drill Co., which will be devoted primarily to chert drilling in West Texas.

Progress in Sound

Use of sonic collectors to remove fine particles from processing exhaust gases is described before A.I.Ch.E.

Leigh S. McCaslin. Jr.

HOUSTON.—Sound is being used successfully in the recovery of sulfuric-acid fog, sulfur fumes, carbon black, oil mist, and certain metallurgical fumes encountered in the processing of metal.

The principles and equipment necessary to utilize sound industrially were described here last week at a regional American Institute of Chemical Engineers meeting by Harold W. Danser, Jr., Ultrasonic Corp.

German scientists initiated research in the early 1900's on the physical principles involved, but industrial applications are a development of the past 4 years. Research work during World War II in the use of sound to locate submarines gave a boost to industrial applications.

Three in use.—Major use of sonic collection equipment has been in combating "smog," which has plagued several United States cities. Danser's company has installed three sonic collectors in Los Angeles where a major smog problem has existed. One of these installations was made for an oil company doing experimental work in the retorting of shale-oil rock. The equipment collects the oil fog created when a hot gas stream of hydrocarbon vapor is passed through a condenser.

One of the other units collects fine sulfur fumes in the gas downstream from a catalyst chamber in which a mixture of H_2S and SO_2 is converted to elemental sulfur. The third installation collects fumes encountered in the processing of metal.

A number of other sonic collectors have been installed throughout the country for various purposes. Refinery engineers are showing great interest in the possibilities of using the equipment with acid-concentrator units. The possibility of using sound to break up foam on top of a liquid is being considered. It is also considered possible that it will be used to precipitate fine particles out of a liquid.

The principle.—The action of sound waves in a sonic collector is to cause the fine particles suspended in the treated gas to vibrate, collide, adhere, and agglomerate together. A sonic field of high intensity and of a frequency between 1 and 4 kc. is created in the vessel. This sonic agglomeration is utilized to collect fine particles which are too light to be collected by the more conventional cyclones and separators. (In its simplest form, a cyclone is a cylindrical vessel in which dust or mist-laden gas is spun and centrifugal force separates the particles from the gas.)

The sound action causing agglomeration is only the first unit of a sonic collection system. Some type of secondary separator has to be used for the actual collection of the agglomerates. In other words, sound is simply used to make small particles larger by causing them to "snowball."

In discussing secondary collectors, Danser disclosed that a new type of entrainment separator is presently being developed. This collector has an efficiency of 90 per cent in recovering particles or agglomerates as small as 3μ or below. (A micron is the millionth part of a meter. Liquid hydrocarbons in casinghead gas range in size roughly from 1 to 100μ.)

This equipment, Danser said, can be used with a sonic collector in recovering particles in the range of 3 to 10μ and, of course, larger. In response to questioning, Danser stated that he believed the new separator might have an oil-industry application in separating liquid hydrocarbons out of natural gas.

Super siren.—Basic unit of the sonic collectors is a specially adapted siren. More specifically, the siren is a "mechanical gas-phase sound generator" of high intensity output capable of delivering as much as tens of kilowatts of acoustic power. It was the development of this generator, according to Danser, that made possible the industrial application of sound in dust and mist collection.

The generators were thus described by Danser: They consist of a rotor facing a stator with precision-matched ports around the periphery of each. A compressed gas is passed through the ports of the rotor and then of the stator. As the rotor turns, alternately opening and closing the ports of the stator, the gas flows out intermittently through the stator ports. An intense sound wave is thereby created at the interface, and is directed by an acoustic horn.

Intensity of the sound wave is governed by the pressure of the compressed gas. Frequency is governed by the speed at which the rotor turns. To govern the rotor speed, a variable speed motor may be used in conjunction with an autotransformer. About 225 cu. ft. per minute of gas, compressed to 8 psig. is required to operate this generator. This much gas flow can be obtained from a compressor requiring about a 10-hp. drive motor.

Typical installations.—The sonic collectors used for recovering the various substances—sulfur acid, fog, sulfur fume, carbon black, oil mist—are similar. A description of a sulfuric-acid-fog collector, which is now in operation, provides an idea as to size of equipment involved and its operation. The gas, which contains fine acid particles, is passed vertically up through a cylindrical agglomeration vessel 2 ft. in diameter and 20 ft. tall.

The top of the vessel contains a sound generator. A sound-pressure level of substantially above 150 decibels is built up by the generator. (Thunder and artillery have a sound intensity of about 120 decibels; ordinary conversation is around 50 decibels.)

After passing through the agglomeration tower, the gas enters a cyclone collector. In this case, the cyclone separator consists of a series of small-diameter, high-velocity separators arranged in parallel. As a final step, the stripped gas is passed to the atmosphere.

New Gas-Storage Method

WARREN, Pa.—A new method of storing natural gas at points of consumption will be demonstrated here next week by J. F. Pritchard & Co. and Floridin Co.

The method involves refrigeration to —252° F. and adsorption by "Methanite," a fullers-earth material. Laboratory experiments have proved successful, and the current demonstration is on a pilot-plant scale and designed to test the application of the method to commercial installations.

The new process is particularly designed for industrial consumers of natural gas who are in danger of having their supply interrupted during extremely cold weather. Experiments also have indicated that propane can be stored in quantity, at atmospheric pressure, and with greater safety than by other methods.

Transmission Fluids

Oil companies this spring to market their own brands for first time; 1.5 million automatic drives now on highways

George Weber

THIS spring for the first time, a number of oil companies will begin marketing their own manufactured brands of automatic transmission fluids.

They will be followed, as qualifying tests are completed, by other refiners and marketers.

This marks another step in the trend away from the tight controls on transmission-fluid marketing, formerly held by automotive manufacturers. The change is being brought about by a growing motorist demand for automatic-transmission service at oil-company filling stations.

In response to this demand, General Motors Corp. and some other manufacturers last year approved the use of certain oil-company branded fluids in their automatic transmissions. These fluids, however, had to be purchased from the companies selling fluid to General Motors, so that the expansion of marketing to oil-company filling stations amounted only to resale of purchased products.

G.M. requirements.—Finally, late last year a plan was set up whereby oil companies would be permitted to manufacture their own products and have them qualified for approved use. General Motors drew up the specifications for a standard fluid designed to meet the requirements of all automatic transmissions and torque converters now on the highways. The designation "Automatic Transmission Fluid Type-A" will now be given any fluid which qualifies in laboratory and road tests.

The Armour Research Foundation will conduct initial screening tests on fluids submitted for approval. These tests of physical properties will be followed by performance tests at General Motors' proving grounds and passed upon in current production units.

Results of both types of testing will then be reviewed by the General Motors committee on automatic transmission fluid comprising G.M. engineering and manufacturing representatives plus a representative of Armour Research Foundation. Armour issues a qualification number for each product tested. This number plus the Type A designation is required to be shown on each container of product together with the company and brand name.

Other companies. — Specifications of the standardized fluid as set by General Motors are subject of some controversy both in automotive and petroleum circles.

Type A is recommended for Hydra-Matic and Dynaflow units and for Packard's Ultramatic. In the Chrysler line of automatic type transmissions, 10-W motor oil is approved, and for their fluid drive units, Chrysler, Dodge, and DeSoto have their own fluids and do not approve the use of any other. Studebaker will not require Type A fluid in its new automatic transmission, as the company states that a premium motor oil of grade 10-W or S.A.E. 10-10-W will suffice. In its new automatic transmission to be introduced this summer, Ford Motor Co. is expected to recommend Type A fluids.

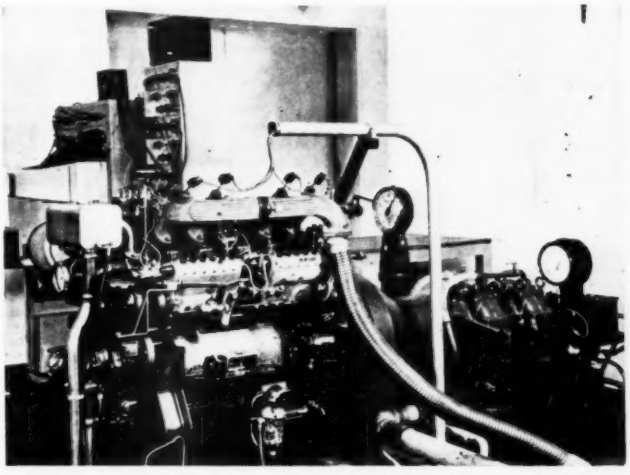
Thus, while all manufacturers do not go along with the standard fluid, a sufficient number of automobiles now on the road require it to constitute a fair market. More than 1.5 million automatic transmission units are now in service, and the current rate of adoption by new makes indicates that an important market will develop in the future for both 10-W and Type A oils.

Type A specifications. — Quality requirements of the standard fluid are high—unduly high in some opinions. The Type A oil will operate satisfactorily in any unit where 10-W or S.A.E. 10 oil is recommended.

Two qualities which are highly important are viscosity index and resistance to oxidation, according to sponsors of the Type A fluid.

Viscosity must test between 54 and 56 seconds S.U. at 210° F. A viscosity index of 150 is required. Flash, fire and pour points are listed respectively at 365° F. minimum, 395° F. minimum and —35° F. maximum.

The fluid must also pass tests on miscibility (with all other fluids), copper-strip corrosion, antifoaming properties, noncorrosion and nonrusting properties, effect on seals, odor, toxicity, durability in cycling tests and viscosity stability. It must show no decomposition when subjected to high temperatures for long periods. It must pass durability, bearing, and performance tests without chattering or squawking, a "stick-slip" phenom-



NO PINK.—Delayed detonation, or what the British call "pinking," is eliminated in this high-speed, six-cylinder diesel engine in the laboratories of Shell Petroleum Co., Ltd., England. It uses the "pilot injection" fuel system, developed by Shell in a single-cylinder test engine in 1946. A small injection of fuel is ignited in the cylinder to form a torch which fires the main fuel charge immediately upon its injection, producing a smooth explosion. Shell says that difficulties of applying the principle to commercial engines have been overcome and the new engines are now being built and will be given road tests soon. A different principle of eliminating knock, developed in the United States by The Texas Co., was described in The Oil and Gas Journal, March 2, page 21.

enon related to the frictional characteristics of the fluid.

Present status.—To date a total of 77 fluids have been given Armour qualification numbers. These fluids, being marketed under 64 different brand names by 39 oil companies and 32 independent marketers, are still handled on a resale basis, all companies purchasing fluid from the same sources used by General Motors for their original fill and service-replacement needs.

Laboratory and road performance tests on new fluids compounded by several individual refiners are now nearing completion. When approved, they will be marketed under presently used brand names, but they will represent the companies' own products.

Rather widespread change-over from the purchased product to self-compounded oils for Type A approval is expected from those companies who consider the market large enough to justify the shift. The motorist's preference for buying such fluids at service stations may in time reduce automobile dealers' volume of replacement fluids to such an extent that some auto companies may eventually discontinue the product as a parts replacement item.

Grass-Roots Research

A.P.I. drilling, production practices committee reorganizes, decides local bodies should initiate, develop projects

Roy F. Carlson

DALLAS.—All research and study of drilling and production practices within the American Petroleum Institute hereafter will be initiated and conducted on a local level instead of by national committees.

This is the purpose of the current reorganization of the central committee on drilling and production practice, as described by its chairman, H. H. Kaveler, of Phillips Petroleum Co., Bartlesville. He outlined the new procedure before the spring meeting of the southwestern district of the A.P.I. Division of Production here this week.

What it means.—Under the new form of organization, the district becomes the source of working groups on any particular subject. Within each A.P.I. district—eastern, Mid-Continent, southwestern, Rocky Mountain, and Pacific Coast—chapters or local sections may form study groups to conduct research or exchange information on any subject of current interest.

Where desired, this work will be coordinated within a district or between districts. For this purpose each district will have a chairman for drilling practice and a chairman for production practice. If a study subject appears to have national interest and importance it will be carried up to the central committee. There the project may be approved for publication, for a paper at the annual national meeting of the A.P.I., or for centralized study by a special-projects committee.

National aspects.—The national aspect of the central committee has been whittled down virtually to the executive committee and a few subcommittees, with functions limited chiefly to coordinating the work of the local groups. The subcommittees will consist of program committee, publications committee, drilling practice steering committee, production practice steering committee, and from time to time some special-projects committees.

At present there is only one special-projects committee, which is completing work on revision of Code 27 on the determination of permeability of porous media. All other former national committees have been disbanded. Their former work will be continued by local groups if and where interested.

Another change is that all committees will be appointed for a period not exceeding 2 years, and may be continued beyond that time only by showing cause. This is to eliminate the former tendency for committees to be appointed for indefinite tenure, with the result that the committee became inactive through changes in personnel or field of activity.

Kaveler said that the reorganization was the result of 6 years of study by the executive committee. It was observed that research work had become rooted in national committees, some of which grew very large due to the wide geographical distribution of their membership.

"Moreover," he told the Dallas meeting, "the work of the national committees was conducted away from the districts and chapters to the point where the very large majority of those active in the production industry did not directly participate in the studies being sponsored by the central committee.

"Under this type of organization, the only time that the national committees could meet was at the annual meeting in November. Another difficulty was that the national committees were composed of groups having varied interest, to the point where a committee became involved in the study of more than one specific subject.

"Reorganization was necessary in order to achieve two primary objectives. The first was to place the work of the central committee at a point where those directly and primarily occupied with the application of new principles would have an opportunity to be active in forwarding a study or investigation of a particular subject. The second was to expedite the work by placing it where those interested in advancing a particular study could meet frequently and, by joint effort, produce a finished report on a specific problem of interest to them or to the industry.

"The obvious means to reach these objectives was to eliminate that feature which caused work to come from a national level downward to districts or chapters, and to substitute a type of structure where work originated in the districts and finally appeared as a finished product through publication of a paper, code, or book at the national level."

Frontier Sold

Ashland adds 10,000 bbl. to refining capacity in deal

ASHLAND, Ky.—The purchase of Frontier Oil Refining Corp., of Buffalo, N. Y., by Ashland Oil & Refining Co., announced last week, brings Ashland's refining properties in four states to a total charging capacity of 77,000 bbl. of crude daily.

Frontier is the fourth company Ashland has taken over during the past year and a half. Acquisition was accomplished by exchange of all Frontier stock for common and preferred shares of Ashland reported to be valued in excess of $2,000,000.

Frontier properties include a refinery at Tonawanda, a suburb of Buffalo, with a capacity of 10,000 bbl. per day, and 110 filling stations in western New York.

Stock in the company was owned by James F. Breuil, former president, and William H. Bennett, who was vice president and secretary. Breuil, whose interests in southwestern oil production were separately incorporated, will leave Frontier for Oklahoma City to head Kingwood Oil Corp. and Breuil Petroleum Corp. Bennett will remain with Frontier as president.

Acquisition of Frontier brings Ashland's expanded refining properties to five separate refineries located in four states. A series of purchases began in November 1947, when the company was successful bidder at $2,150,000 for the government-owned refinery which the company operated during the war for manufacture of 100-octane gasoline.

These former government properties located near the company's original Catlettsburg, Ky., refinery, in-

cluded an 8,500-bbl. T.C.C. unit, an H.F. alkylation unit, and a butane isomerization unit, together with gas concentration and treating facilities. Incorporation of these properties expanded the Catlettsburg plant to 43,000-bbl. capacity.

During the summer of 1948, merger of Allied Oil Co. of Cleveland with Ashland added the 10,000-bbl. Canton, Ohio, refinery of Allied's subsidiary Central Pipe Line Co. to Ashland operations. This plant, now rated at 12,000 bbl. crude capacity, has thermal cracking and catalytic polymerization facilities, now being modernized and expanded.

Last December Ashland merged with Aetna Oil Co. of Louisville through exchange of stock. This brought it a refinery at Louisville with a crude capacity of 8,000 bbl. per day and thermal cracking capacity of 4,600 bbl. per day, plus river barges, bulk plants, and more than 200 filling stations.

Later the same month, Freedom-Valvoline Oil Co. was purchased by Ashland. Refining facilities of this company include a complete 4,000-bbl. refinery at Freedom, Pa., with lube-oil manufacturing facilities, 1,000 bbl. in thermal cracking and 750 bbl. in thermal reforming plants.

Stock Buying

Barnsdall Oil has retired 518,407 shares since 1948

BARNSDALL OIL CO.'S policy of buying its own stock resulted in the retirement of 518,407 shares during 1949 and through February 1950, it is revealed in the company's annual report.

The total cost was $26,467,250, or an average of $51.05 per share. As a result there were 1,704,900 shares outstanding as of March 1, compared with 1,865,800 on December 31, 1949, and 2,223,307 a year previously. The number of stockholders declined from 14,519 in 1947 to 11,933 in 1949 and to 10,244 as of now.

The repurchase program was stopped last month when Sunray Oil Corp. purchased 800,000 shares, or about 45 per cent, for $56 per share, and placed four Sunray men on the Barnsdall board of directors.

Barnsdall's net earnings last year were $14,852,469, or $7.96 per share, compared with 1948 earnings of $6.42 per share then outstanding.

The report states that Barnsdall engineers estimate the company's proven reserves of crude and condensate at 161,718,496 bbl., whereas the firm of DeGolyer & MacNaughton, in a preliminary estimate which Barnsdall calls "extremely conservative" puts the figure at 125,000,000 bbl.

Contrary to the general industry trend, Barnsdall's net crude production increased last year and averaged 32,977 bbl. for the year.

WATCHING WASHINGTON

Bertram F. Linz

Tip to the Waiter

Every time legislation dealing with oil or gas comes up in Congress, the writing boys get on the band-wagon and beat the tom-toms over the tremendous sums spent by the industry in lobbying.

If the oil and gas men are tossing their millions around in an effort to influence Congress it isn't apparent in the reports filed under the lobbyist registration act, which indicate that they account for about 3 per cent of the nearly $8,000,000 reported spent in "educating" Congress by all groups.

Compared with the more than $1,500,000 reported by the American Medical Association in its fight against socialized medicine, the slightly more than $200,000 reported by organizations in the oil and gas industries looks like a tip to the waiter and is less than the amount spent by union organizations, including those that have hollered about tidelands and natural-gas "grabs."

It's possible that any or all of these figures may be high or low, for while the act requires the reporting of expenditures for lobbying there is a considerable difference of opinion over what constitutes lobbying and no clear-cut specifications have yet been written. But in all probability, any changes in the figures themselves wouldn't materially alter the proportions, and if the oil and gas industries want to achieve prominence maybe they should follow the example of the American Medical Association and assess everybody in the industry 25 bucks.

Course of Events

Reports from London indicate that the British Government is not disconcerted by the direction the Anglo-American oil talks have taken; in fact, it anticipated they would go through the course they have.

London does not see the talks deadlocked, apparently not requiring that any thought be given to any modification of the order curtailing imports of dollar fuel oil and gasoline.

British officials who predicted the course the matter would take hit it right when they said that talks with the companies in London would be followed by talks between the companies and the State Department, discussions between the British and American negotiators, further talks between the British officials and the companies, and a return of the latter to the State Department and then further talks between the two governments. That is exactly the course that has been followed.

In its latest report to the Organization for European Economic Cooperation, Britain laid down its present program for dollar imports, showing that while its imports of dollar petroleum products during the fiscal year 1949 amounted to $144,000,000, it is planned to cut them during the current fiscal year to $122,800,000, with further cuts in fiscal 1951 to $104,600,000 and in 1952 to $71,700,000.

Corny Idea

Secretary of Agriculture Charles F. Brannan has tossed the idea of making motor fuel from corn out the window—but it may bounce right back into his lap a year or so from now if government stocks of surplus corn continue to mount.

Brannan's objection to the corn-alcohol proposal, sponsored by Sen. Guy M. Gillette of Iowa, is that to be feasible corn must be available at 25 cents or less a bushel and the resulting alcohol must be exempt from tax.

The potato glut brought the alcohol question to the fore again, but the most ingenious figurers in the country couldn't figure it out. The best figures run something like this: The cost of transporting potatoes from Long Island, where lots of them are raised, to Philadelphia, where Publicker Industries has a plant, runs around 20 cents a 100 lb. From each 100 lb. it's possible to squeeze out 1 gal. of alcohol at a processing cost of about 15 cents a gallon. The 20-cent transportation cost can be halved by selling the bags in which the potatoes are delivered—they're worth 10 cents each—but the best that can be done is to produce alcohol at a cost of 25 cents a gallon, provided the potatoes were furnished without cost.

Very similar figuring would have to be applied to corn or other grain.

Currently, the Government has more than 200,000,000 bushels of corn under its support program. What it may have a year from now is something else. But if it begins to pile corn up in the same proportions as potatoes, somebody is going to revive the old alcohol-fuel idea.

Scurry Summary

Three-county area now has 223 rigs operating; lease play active to Oklahoma line; pipe-line facilities expanding

Roy F. Carlson and Carl F. Hoot

SNYDER, Tex.—Reef oil today is the byword in approximately a dozen counties located along the eastern platform of West Texas' huge Permian Basin. Center point is Scurry County. Here, a billion barrels or more of new oil reserves have been opened up since the first reef discovery well was brought in.

This status report forms a roundup of summary data on the recent activities in the Scurry area—the latest of many articles and reports published on this area by The Oil and Gas Journal during the past year.

DRILLING, EXPLORATION

Proven area.—In Scurry County more than 50,000 acres are considered proven or semiproven for reef type oil production. There now are a total of 490 wells producing from the Canyon reef lime, found at depths ranging from 6,250 to 7,000 ft. However, other new oil production is being developed from the Strawn at approximately 7,100 ft. and the Ellenburger at approximately 8,000 ft.

Several new oil discoveries also have been found in Kent and Borden counties adjoining Scurry to the north and west, respectively. These are regarded as having very great potentialities—but much exploration needs to be done for further definition.

Other eastern platform counties in the reef play include Crosby, Dickens, King, Garza, Stonewall, Fisher, Howard, Mitchell, Nolan, Sterling, Tom Green, and Runnels.

Active rigs.—Scurry County last week had 187 rigs operating, including 175 on development wells and 12 on wildcats; Kent County had 17, including 6 in the Cogdell area and 11 wildcats; Borden had 19, including 6 field wells and 13 wildcats. These figures include only those wells projected to the reef or deeper.

Map of the West Texas reef area.

While activity in Scurry has leveled off, leasing play for reefs has extended northeast through Kent, Stonewall, King, Fcard, and Hardeman counties to the Oklahoma line. One major company was reported to have 40 land men in the area taking leases along this trend.

Pool engineering committee.—Operators in the Scurry County reef fields have plans under way to form a pool engineering committee. Its purpose is to obtain basic engineering information to determine the proper method for well operation, to evaluate pressure maintenance, etc. More than 75 operators are considering the plan.

Demand for Scurry County's sweet

One way to beat the high rents in Scurry County. Living quarters, long at a premium, often are unavailable. Drilling crews of Sawyer Drilling Co. found a solution in this Army-type tent. Rig location is in Kelly area.

Left: Construction work on Magnolia Pipe Line Co.'s 6-in. crude-oil line to gather oil from Diamond M field. This connects with 8-in. line running to Roscoe station. Work is being done by Crosley & Handy Pipe Line Construction Co., Wichita Falls. Right: Installation of Pan American Pipe Line Co.'s 6-in. line running from the west side of Kelly field to pump station being built ½ mile west of Snyder. Work is being done by Golightly Pipe Line Construction Co., Houston.

Left: Narrowness of the 78-ft. railroad right-of-way necessitated a long layout of this rig and mud pits. Rig is that of Carl B. King Drilling Co. working for Ryan Hayes & Burke's 1 Panhandle & Santa Fe on the P&SF right-of-way, North Snyder field. Locations are reported being made 1,000 ft. apart along the right-of-way. To keep development within the prescribed acreage, it will be necessary to run many well-direction surveys. It will be necessary to reduce the amount of weight on the bit to forestall any tendency of the hole to turn off vertical.

Right: Second church to benefit from Scurry development is the Union Methodist Church, 5 miles west of Snyder, behind which may be seen W. E. Dunnigan's rig drilling the 1 Union Methodist Church for Bert Fields. In the foreground is the flowing well on the property of Union Baptist Church.

crude, currently selling for $2.58 per bbl., has crowded existing pipe-line facilities.

NEW PIPE LINES

New pipe line projects in the reef territory include:

Pan-American Production Co.—A 20,000 to 30,000-bbl. crude-oil gathering system in the Kelly area of central Scurry County. This will connect with the Basin Pipe Line System's line near Colorado City in Mitchell County, Texas. Future plans also call for possible connection with a common carrier pipe line to the Gulf Coast.

Gulf Refining Co., Pipe Line Division.—A 20,000 to 25,000-bbl. combination 8 and 10-in. line. This lateral will extend 30 miles from Roscoe station to Snyder. Roscoe pump station is on the Gulf line from West Texas to Port Arthur.

Stanolind Pipe Line Co.—New line into southern Kent County, to new Cogdell reef field 1 mile north of Scurry County line. This 36-mile installation will be an extension of the firm's present line to Post field in Garza County.

Pasotex Pipe Line Co.—Has authorized 32 miles of 4 to 8-in. gathering system; crude delivery will be to Basin System.

Texas-New Mexico.—Announced new 10-in., 37-mile line to North Snyder and Cogdell fields; will connect to Basin System. Firm already is gathering crude at the Sharon Ridge and Diamond M pools.

Magnolia Petroleum Co.—Concern has large system purchasing Scurry County crude, additional gathering facilities considered.

GASOLINE PLANTS

Four or more large natural gasoline plants are either starting construction or authorizations are being considered. Gas-oil ratios of Scurry reef wells are normal, ranging about 800 to 900. However, liquid-hydrocarbon content of the gas is exceedingly high. Gas analyses made by one company indicate that more than 6 gal. of propane and heavier products per 1,000 cu. ft. of gas may be recovered if producers conduct their operations to secure a stabilized crude.

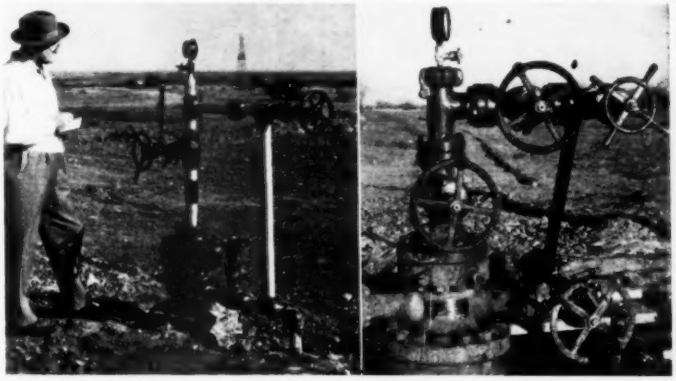
Barnsdall Oil Co.—This company in cooperation with oil operators is planning construction of a natural-gasoline plant in the North Snyder area which may eventually serve from 15,000 to 22,000 productive acres. A comprehensive preliminary program of gas gathering presently is being formulated, which will conserve much gas immediately and make it available for early utilization-sale.

These plans predicate a high-pressure (500 psi.) gas-gathering system over much acreage in the North Snyder area; connections will be made to high pressure traps. The high-pressure gas-gathering system, upon completion, can immediately serve new absorption type plant; later also an extensive low-pressure gathering system will be installed.

Standard Oil Co. of Texas.—Initial capacity 30,000,000 cu. ft. daily; location near center of company's large block 7 miles north of Snyder.

Fullerton Oil Co.—Gas capacity, probably 30,000,000 cu. ft. daily; refrigeration-type absorption plant; location in Kelly area.

Lion Oil Co.—Planning construction of 40,000,000 cu. ft. plant; gas from Diamond M and Sharon Ridge reef areas.



Left: Discovery well (Chapman & McFarlin) in Cogdell field, Kent County. Fourth producer here has just been completed, flowing 2,200 bbl. of 41.9° oil through a ¾-in. choke. In photo John Reilly, of The Oil and Gas Journal, takes a note of the tubing-head pressure. Right: The Livermore discovery in Borden County, a new Canyon reef discovery which flowed 1,487 bbl. per day of 46° oil through a ¾-in. choke. The Livermore well is 5½ miles southwest of recent Canyon discovery in Borden County, the 1 Van Roeder of Amerada Petroleum Corp. The Cogdell and Livermore wells are 50 miles apart.

Tax Boost

Texas oil industry to pay 10 per cent more this year

Leigh S. McCaslin, Jr.

AUSTIN.—The tax bill of the oil and gas industry in Texas will be increased an estimated $12,374,500 during the next 18 months by a 10 per cent increase in the omnibus tax rates.

The omnibus tax bill is a "catch-all" measure (officially known as House Bill 8 of the 1941 legislature) covering a large number of items and garnering a large portion of the state's income. The bill was signed into law last week by Gov. Allan Shivers.

Despite the increased tax burden, the oil industry was not unalterably opposed to the measure. The money raised is to be used for the state's hospitals and special schools. Most people seem agreed that the eleemosynary institutions are in serious need of the funds. R. B. Anderson, president of the Texas Mid-Continent Oil & Gas Association, told a house committee the petroleum industry "will not be an unwilling contributor to aid people who cannot speak for themselves."

Anderson made this statement, he said, despite the fact that "ours is a troubled industry." He enumerated the troubles as decreased demands for Texas oil, threats to the depletion allowance, and prospects of increased competition in the fuel markets.

What it means.—In all, the 10 per cent increase in the rates of the omibus tax bill is expected to raise about $31,784,944 before it expires August 31, 1951. The estimated $12,374,500 from oil and natural gas is roughly 40 per cent of this total. An additional $49,500 will come from a tax on oil and gas servicing. Also, the closely related carbon-black industry will contribute an additional $248,000 under the new rates.

The original tax rate on crude oil under the omnibus bill was 4.125 per cent of value. The 10 per cent increase will raise this figure to 4.5375. During the past fiscal year, the old rate brought the state an income of $87,338,191.

The original tax rate of crude oil, under the omnibus bill, was 5.2 per cent of value. The new rate will be 5.72. Tax receipts for the past fiscal year from the gas tax were $8,862,970.

In addition to the gross production tax on crude and natural gas, operators pay franchise taxes, drilling permit fees, payroll taxes, regulatory taxes, 4 cents per gallon on gasoline used by the company cars and trucks, and ad valorem taxes (not only to the state, but also to counties and school districts).

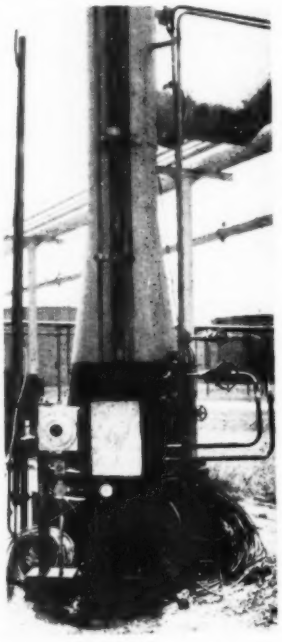
An inconsistency in the state's tax program, which is pointed out by some, is that only five of the state's many natural resources (crude oil, natural gas, sulfur, carbon black, and cement) are taxed. Timber, salt, sand, gravel, gypsum, limestone, magnesium, clay, and fuller's earth are among the natural resources escaping taxation.

Reef Shutdown

SNYDER.—The Texas Railroad Commission's order of an 8-day shutdown for Canyon reef pools of Scurry County will not affect the production of those wells. By delaying the 8-day shutdown until March 18, operators will lose none of their allowable under the March order, which calls for [illegible].

The order, effective 7 a.m., affects Kelley, Diamond "M," North Snyder, and Sharon Ridge Canyon lime pools. The wells are to remain shut in until 7 a.m., March 26, at which time each operator will be required to make a bottom-hole pressure determination with a pressure bomb or some other device calculated to give results of comparable accuracy. Pressure data are to be taken at a minus datum point of 4,400 ft.

The commission has set a hearing for April 14, at which time operators have been directed to show cause why the Canyon lime pools of Scurry should not be combined into one common reservoir. The most efficient rate of production for the area also will be discussed.



***FLARE LIGHTER.**—To light the waste gas which intermittently flares from refinery stacks some operators have tried incendiary bullets, rockets, torches hoisted on cables, and other devices. At its Baytown refinery, Humble Oil & Refining Co. is now using the 10-ft. lighter shown at the left in this picture, here being tested on the ground before erection on top the stack, center. Gas, fed through a copper tube, is mixed with air in the pipe and ignited by electricity, in turn lighting a pilot flare which normally burns continuously. (Engineering details of this igniter will appear in an early issue.)*

First Unit Agreement

AUSTIN.—First unitization agreement under the law enacted by the last regular session of the legislature has been approved by the Railroad Commission.

Continental Oil Co., as unit operator, obtained approval of the operating and unitization agreement for effecting secondary recovery operations in the Todd Deep (Crinoidal) field, Crockett County. The new Texas law allows cooperative development, subject to Railroad Commission approval.

The Crinoidal reservoir has been developed on 40-acre spacing. The productive limits have been defined by a water table on the west, pinch-out of the pay sand on the north and east, and by a dry hole on the south.

Evidence presented at a hearing on the application indicated that the reservoir pressure can be maintained above the bubble point until 1956 by injecting 5,000 bbl. of water daily. Continental engineers said oil recovery in this period would be increased 6,000,000 bbl.

ASSOCIATIONS

Chemists' Conclave

NEW YORK.—The biggest international chemical conclave in history is the billing being given to a series of meetings here beginning on September 2, 1951.

The American Chemical Society will celebrate its diamond jubilee, followed by the sixteenth conference of the International Union of Pure and Applied Chemistry and the twelfth International Congress of Pure and Applied Chemistry.

The combinations of international meetings will be the first of its kind in the United States since 1912.

Production Meeting

OKLAHOMA CITY.—A variety of technical subjects will be presented at the spring meeting of the Mid-Continent district of the American

Petroleum Institute, Division of Production, to be held March 29-31 at the Skirvin Hotel here. Among the papers to be presented are:

March 30

"Drilling by the Turbine Method," Critchell Parsons, Engineering Development Co., Dallas; "Oil Emulsion Muds," Thad Randolph, Oil Base Muds, Inc., Los Angeles; "Relative Economics of Diamond Coring and Conventional Drilling," Ralph Deely, Drilling and Service, Inc., Dallas; "A Study of the Buckling of Rotary Drilling Strings," Arthur Lubinsky, Barnsdall Research Corp., Tulsa.

March 31

"A Preliminary Report on Oil Recovery by High-Pressure Gas Injection;" "A Review of Gun-Perforating Methods," Val Forsyth, Lane-Wells Co., Los Angeles; "A Survey of Recent Developments in Electric Logging," Robert G. Hamilton, Well Log Consultant, Tulsa; "Some Examples of In-fill Drilling," H. H. Kaveler, Phillips Petroleum Co., Bartlesville, Okla.; "Vocational Training in Oil-Well Drilling and Production Operations," John Woodruff, University of Texas, Austin; "Artificial Lifting of Deep Wells," Russell Curtis, Carter Oil Co., Oklahoma City; and "Estimation of Remaining Secondary-Recovery Reserves By Decline-Curve Methods," W. A. Heath, Earlougher Engineering Co., Tulsa.

NATIONAL AFFAIRS

Tanker Dilemma

Sale of idle tankers to foreign operators asked

WASHINGTON.—Shift of the world oil supply center to the Middle West and the much lower operating costs of foreign shipowners are beaching the American tanker fleet, a Senate Interstate Commerce subcommittee was told last week at hearings on transfers to foreign registry.

The difficult situation of the tanker owners was laid before the subcommittee first by Gordon Duke, of Southeastern Oil Co., who said his company was "heading toward bankruptcy" if the Maritime Commission did not withdraw its opposition to the sale of four Liberty-type tankers to the Mexican government, which would pay for them in oil.

Duke told the subcommittee the ships had been laid up for months, and no decent offers had been received for them from Americans. The vessels were purchased from the Maritime Commission, he said, and there is still more than $1,500,000 owing the Government on them.

The story of no reasonable offers was also recited in a statement by Oliver R. Grace, president of the Southern Seas Steamship Co. Because no decent price could be secured in this country, Grace said, the company wants to sell a wartime tanker to a Chilean firm.

Grace said the coastwise tanker fleet is twice as big as is needed for the movement of oil, and the growing importance of the Middle East and the 50 per cent or better lower cost of operating foreign tankers has seriously affected the American fleet.

Applications for transfers are considered from the standpoint of whether the ship involved is necessary to the merchant marine and needed for national defense, it was explained by Maritime Commission Chairman Philip B. Fleming, and Commissioner David J. Coddaire added that he would favor a transfer if it meant the American owner thereby would acquire a new and better vessel.

Several witnesses agreed with Sen. Warren G. Magnuson of Washington that the ideal solution would be to keep all vessels, new and old, under the American flag. Maritime Commissioner Raymond S. McKeough, pointing out that the authority of the commission to pass on transfers had never been passed on by the courts, urged that Congress order the suspension of all transfers for a period of 4 to 5 years to provide an opportunity for testing the commission's powers.

Oil Talks Recessed

WASHINGTON.—Top members of the British delegation which has been discussing the dollar-sterling oil problem with American officials left for London last week after suggesting that further discussion of the order substituting sterling for dollar oil in the United Kingdom should be held in London.

Their departure left up in the air the possibility of further talks in Washington, although it is believed that if the State Department works out counterproposals or statements of fact with which London takes radical issue they would return for further negotiations.

Officials here said informally the departure of Victor Butler of the British ministry of fuel and power and the Treasury representative had no significance as regards the negotiations.

$1.05 Imports Tax Asked

WASHINGTON.—A "painless" revenue of $300,000,000 a year could be secured by imposition of a tax of $1.05 per barrel on imports oil in lieu of the present 10½-cent tax, the House Ways and Means Committee was told last week by Rep. Ed Gossett of Texas, author of a measure to impose the higher charge.

Gossett offered his proposal purely as a revenue measure, expressing the belief the higher rate would not be reflected in higher costs of oil products to American consumers and as probably not reducing the importation of oil which might be needed.

Transportation Problems

WASHINGTON.—A House Interstate Commerce subcommittee studying the transportation situation with a view to writing a national transportation policy was told last week that it will take a year for the Transportation Association of America, now engaged in a similar study, to prepare a report for Congress on the basic issues of the transportation problem.

But when the report is submitted, Dr. John H. Frederick, association consultant, said it will represent majority and minority opinions on transportation issues, developed by a number of panels of experts, supported by 22 regional forums and 236 "enterprise councils" which are being organized.

The association is a nonpartisan, nonprofit institution supported by 9,000 enterprises, it was stated.

Eight panels already have been set up, including a national pipe line panel composed of the executives of the principal pipe line carriers, with J. L. Burke, president of Stanolind Pipe Line Co., Tulsa, as chairman.

NEXT WEEK

"Deterioration of Cooling Tower Lumber."—Noticed signs of delignification (removal of wood material) in expensive cooling tower structures? Authors Blohm and Frazier, Fluor Corp., Ltd., surveyed over 500 cooling towers, accumulated data on structural conditions, and water handled. Article reports causes, offers suggestions for controlling this problem.

New Plant for Lubricants.—Discussion of new manufacturing facilities at Pure Oil Co.'s Smiths Bluff, Tex., refinery.

Induflux.—Description of new method for testing fatigue in sucker rods; by D. H. Stormont, California district editor.

Drilling with Lime-Based Muds.—Report by Jack L. Battle, Humble Oil & Refining Co., and Preston E. Chaney, Sun Oil Co., Beaumont.

New Test for Pipe Lines.—J. C. Wright, Panhandle Eastern Pipe Line Co., discloses new displacement method of measuring gas flow through pipe lines, for checking flow efficiencies.

Planning Gas Compressor Stations.—No. 5 installment of current series, concerned with safety devices and station heating.

EUROPE

Surplus Capacity?

French refining output well ahead of consumption; ECA still concerned over possible overbuilding in Europe

WHAT may be the first indication of ample, if not excess, European refining capacity has appeared in the continent's largest refining country, France.

The government Commission de Modernisation des Carburants in a report issued in Paris said the French refining industry is now facing "insufficient consumption." During the first half of last year, refinery production was 5,252,799 tons against consumption of 4,231,605 tons.

Plans for the current fiscal year call for the refining of 12,900,000 tons. This corresponds to the estimated requirements of both North Africa and metropolitan France, the report said.

France's original program shortly after the war called for building up a capacity of nearly 24,000,000 tons. This has been scaled down to about 18,800,000 tons, equivalent to about 380,000 bbl. daily.

ECA concern. — Officials of the Economic Cooperation Administration as well as various American oil companies have for some time been concerned over possible overbuilding of world refining capacity, particularly in Europe. Estimates have been made in the industry of a 500,000 to 600,000 bbl. daily excess capacity world wide by 1953.

Much of this over-all program is accounted for projects encouraged by governments for national and economic reasons. Currency problems contribute to the situation since crude is the cheaper import. The Curacao and Aruba refining centers, with large shipments to Europe, are regarded as the plants which will be most seriously affected.

Background.—France several months ago started making shipments of gasoline to Australia, and it is understood some five of these shipments have been carried out. The reasons for these distant exports were studied by the ECA, which has assisted in the French refining expansion.

The French refining industry made a rapid reconstruction after the war. Unlike Britain, which is building a 20,000,000-ton refining industry virtually from the ground up, the French prewar had a capacity of about 8,000,000 tons. The goal in France has been expansion of existing facilities, product improvement, and better balance in operations.

The report of the modernization committee said the trend of "insufficient consumption" started in the last 6 months of 1948, continued last year, and added that neither processing of crude for foreign companies nor exceptional exports due to the lowering of prices could absorb the production surplus.

Increasing requirements for petroleum products in French North Africa may alleviate the situation somewhat. The report said needs of North Africa and the overseas territories during the last half of the year resulted in processing an additional 900,000 tons. Processing of oil during the first half of 1949 for foreign customers who supplied the necessary crude reached only 640,000 tons, and this arrangement decreased considerably with the buildup of refining capacity in Britain, one of the chief customers of the French refineries.

During the second half of 1949, the report said, French refineries continued to install equipment delivered under the Blum-Byrnes agreement, to carry out engineering work for future projects, and to improve general services and storage facilities. On the basis of supervised import licenses during the first half of the year, value of foreign oil equipment imported into France was estimated at $760,000 from American sources and £35,500 from British sources.

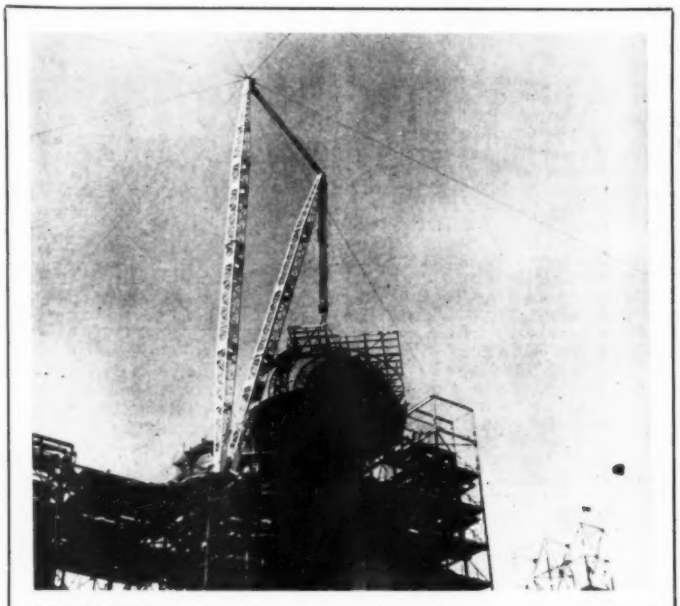
Refining Cut

ECA not to help overbuild European refining capacity

WASHINGTON.—Not all refinery-expansion projects planned by European countries will be built, Paul G. Hoffman said this week.

Hoffman, administrator of the Economic Cooperation Administration, told a House interstate subcommittee investigating the oil situation that ECA will not provide funds for capacity in excess of that which ECA officials deem justified, and that Europe will not have the free dollars to carry the program through.

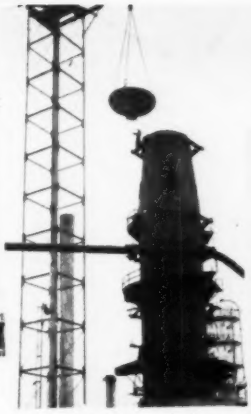
Until the present dollar-sterling controversy is settled, Hoffman said



ABADAN CRACKER.—The 100-ton cone here being swung into position will cap the regenerator in the new catalytic cracking unit of the 500,000-bbl. daily refinery of Anglo-Iranian Oil Co., Ltd., at Abadan, Iran. The cone was fabricated on the site and required about 4 months to build. It consists of welded steel sections.

(1) Double-cyclones are lowered into positions at the top of the regenerator.

(2) The conical joining section is placed in position on top of the regenerator.



(3) The bottom of the reactor rests on the conical section above the regenerator.

(4) The top of the reactor is hoisted into place. This completes the 2-in-1 unit.

Another
2-in-1 Cat Cracker erected in the field by Chicago Bridge

Here's another refinery that is using the new Universal Oil Products Company Fluid Catalytic Cracker, the compact 2-in-1 unit that has the reactor mounted above the regenerator in a single column. We erected this modern cracker at the Indianapolis, Indiana, refinery of the Rock Island Refining Corp.

This new unit produces propane, butane, high octane gasoline and light cycle stock which is further blended to produce domestic fuel oil No. 2. The unit has a rated capacity of 5,000 bbl. per day and replaces a thermal cracker reformer which has been converted to crude-distillation service.

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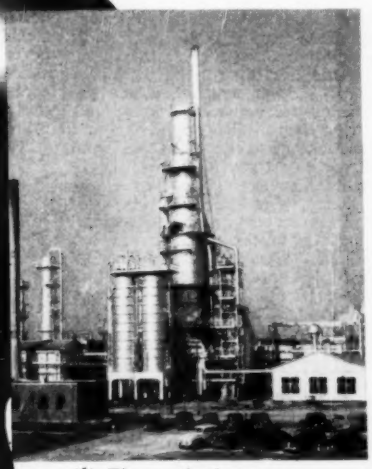

(5) The completed regenerator-reactor unit with two catalyst storage hoppers in the foreground.

CHICAGO BRIDGE & IRON COMPANY

Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY and GREENVILLE, PENNSYLVANIA

Atlanta, 3 ..... 2154 Healey Bldg.
Birmingham, 1 ..... 1536 North 50th St.
Boston, 10 ..... 1025—201 Devonshire St.
Chicago, 4 ..... 2128 McCormick Bldg.
Cleveland, 15 ..... 2204 Guildhall Bldg.
Detroit, 26 ..... 1514 Lafayette Bldg.
Havana ..... 402 Abreu Bldg.
Houston, 2 ..... 2119 National Standard Bldg.
Los Angeles, 17 ..... 1523 General Petroleum Bldg.
New York, 6 ..... 3347—165 Broadway Bldg.
Philadelphia, 3 ..... 1615—1700 Walnut Street Bldg.
Salt Lake City, 4 ..... 525 West 17th South St.
San Francisco, 11 ..... 1254—22 Battery Street Bldg.
Seattle, 1 ..... 1325 Henry Bldg.
Tulsa, 3 ..... 1606 Hunt Bldg.

REPRESENTATIVES AND LICENSEES

Horton Steel Works, Limited, Fort Erie, Ontario, Canada
Ateliers et Chantiers de la Seine Maritime, Paris, France
Constructions Metalliques de Provence, Arles-sur-Rhone, France
Chicago Bridge & Iron Company, Ltd., Apartado 1348, Caracas, Venezuela
Compagnia Tecnica Industrie Petroli, Rome, Italy
Whessoe, Limited, Darlington, England
Motherwell Bridge & Engineering Company, Limited, Motherwell, Scotland
Comprimo N.V., Amsterdam—O, Netherlands

further, no authorizations will be granted for further United Kingdom refinery construction, and ECA is adhering firmly to its policy of not financing any facility unless its production can be sold without resort to tariffs, import quotas, or other barriers to trade.

"Quantitative restrictions on imports by the European countries means the end of any effort to develop world trade," he declared.

Current ECA estimates indicate that the Marshall plan countries will spend nearly $700,000,000 on oil during the coming fiscal year, it was testified by Dr. Oscar E. Bransky, chief, and Cornelius Dwyer, assistant chief, of the petroleum branch. Of this, $375,000,000 will represent the f.o.b. value of United States company oil imported, $148,000,000 petroleum equipment for use in and outside Europe and $166,000,000 the net dollar cost of British company operations in the United Kingdom and outside of Europe, exclusive of equipment.

Outlining the British situation, Bransky testified that while the British have always insisted their expansion program was not excessive and was designed to meet only their commercial market needs, and that their use of current surpluses to displace American oil from the sterling area, Argentina, Sweden, Norway, Denmark, Finland, Spain, and Portugal was only temporary and would not be continued, ECA has refused to approve either refinery construction in the United Kingdom beyond that already financed or to finance any of Britain's overseas expansion for which $80,000,000 was requested in 1949.

LATIN AMERICA

Campaign for Exports

Venezuelan representatives visit United States in effort to counteract independents' campaign to restrict imports

THE Venezuelan Government is making increasing efforts to counter the campaign of United States independents for additional restrictions on imported foreign oil.

For the first time in its petroleum history, the government asked the producing companies to reduce voluntarily the rate of production and consequently imports. This was done in order to weaken the major argument for heavier duties or quota restrictions.

The results of this move are reflected in preliminary Venezuelan production figures for the first 3 weeks in February. They show a decline of 133,000 bbl. daily from the all-time high level in January of about 1,470,000 bbl. daily.

Case presentation.—First of a group of about 20 Venezuelan businessmen arrived last week in New York. They plan to separate into groups to visit various parts of the United States and present the case against additional import restrictions. The remainder of the group is due to arrive this week.

This group of Venezuelan leaders plan to see President Truman. One of their principal arguments is that heavy curtailment of Venezuelan oil imports into the United States would react seriously against other United States sales in that country. Venezuela is the top market for many United States exports. Last year it bought nearly $600,000,000 in American goods.

Venezuela is acting to protect the major market for the petroleum production on which its economy is dependent. The British Government restrictions against dollar petroleum imports into the sterling area have caused added alarm, but Venezuelan leaders consider the possibility of import curtailment into the United States by far the greater threat.

Ambassador's view.—Walter J. Donnelly, United States ambassador to Venezuela, assured Venezuela that officials of the United States Government were aware of the friendly economic and political relations between the two countries. This came in a public statement following his recent return to Caracas from Washington where he met with President Truman.

"My visit also gave me the opportunity to realize the problem faced at the present time by oil producers within the United States and at the same time the problem of the world oil situation," the ambassador said in his statement in Caracas.

"I believe that in general it is not known that oil production in the United States has been reduced by some 800,000 bbl. per day. Of this reduced production, 92 per cent corresponds to the State of Texas alone.

"The transcendency of petroleum in the Texas state budget is evidenced by the fact that the high percentage of funds used for school maintenance and improvement is derived from taxes of petroleum produced in that state.

"I pointed out to officials of my government, congressmen, and other persons that Venezuela is anxious to cooperate with the United States oil producers and importers, and that the reduction of oil production in Venezuela, which I was informed amounts to nearly 11 per cent with regard to the maximum obtained in January 1950, corresponds to the percentage of reduction of oil production in the United States. . . ."

Donnelly also told Venezuela that officials in Washington were impressed not only by the importance of the Venezuela market to the United States but also by "the system of free enterprise prevailing in Venezuela and by the importance of the country as a field for United States capital investments."

"Although I cannot state that the possibility of the legislation reducing oil imports into the United States has been eliminated, I am under the impression that such possibility is now smaller," he said.

How they cut.—As for the recent production cutbacks, oil company officials said that they were purely voluntary at the government's suggestion but that the action was taken quite willingly since the interests of the companies and the government in the matter in general coincide.

As the largest producing company, Creole Petroleum Corp. made the largest cuts. The amount and the affected fields have naturally varied from time to time over the last month. In the last week of February, reports from Venezuela were that the company had 140,000 bbl. daily shut in with 118,500 bbl. daily in Western Venezuela. This brought the company's production down to about 526,000 bbl. daily. More recently the company had made some increases in output and was back at about 600,000 bbl. daily, still considerably below the January level.

Mene Grande Oil Co., according to the Caracas reports, had more than 60,000 bbl. daily shut in in Eastern Venevuela, and about 14,000 bbl. daily in Western Venezuela. Socony-Vacuum Oil Co. of Venezuela had about 14,000 bbl. daily closed in; Texas Petroleum Co., about 8,000 bbl. daily closed in in Mara and 12,000 bbl. daily in Tucupita; Richmond Exploration Co., about 18,700 bbl. daily closed in.

The Shell organization, the second largest producer in Venezuela, as of February 9, had an operated production of 442,000 bbl. daily with 10,000 bbl. daily closed in in Mara and about 20,000 bbl. daily in Tia Juana. More recently Shell's cutback were reported at 10,000 bbl. daily.

Shell's reductions were described as a more or less "token cut." This company can continue to make full sales into the sterling area since its production is classified as sterling oil.

These recent production drops, taken together with the decline in exploratory operations that has taken

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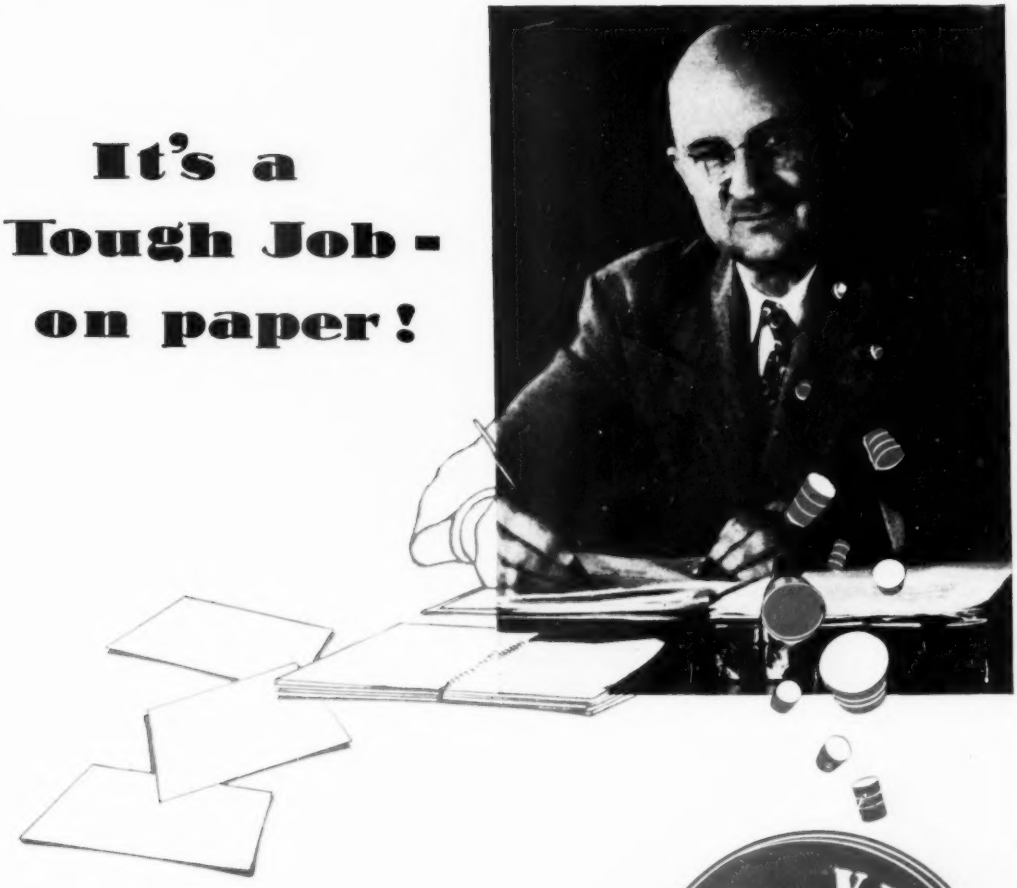

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place in Venezuela over the last year, were resulting in unemployment and causing new sniping at the industry by extreme left political elements. It was estimated that about 15,000 out of a total labor force of 40,000 to 45,000 oil field workers have lost their jobs in Venezuela in the last 14 months.

Oil Search Ends

Shell abandoning Ecuador projects after six dry holes

A MAJOR oil-exploration effort carried out for the last 12 years in the difficult country of Eastern Ecuador is coming to an end.

The program was commenced by the Royal Dutch-Shell group. Late in 1948 it reached a joint operating arrangement with Standard Oil Co. (Ecuador) S.A., to continue the work.

Disclosure that the program is being terminated was made in Ecuador by the republic's president, Galo Plaza Lasso, who said that the concession was being renounced this year and that operations would be terminated in 7 months at the latest. It was reported that a total of about $40,000,000 has been spent by the companies in the work.

The program included a thorough geological and geophysical investigation of the region. A total of six wells were drilled, with negative results. The last is now being completed.

Shell started prior to the war with a concession over nearly 20,000,000 acres, virtually all the eastern part of the country to within 50 km. of the border. Half of this area was relinquished, and work continued on the remainder. Shell remained the operating company after the interest was acquired by the Jersey Standard organization.

Shell's work in the area has been particularly distinguished by its use of air transport. The operations were carried on in the remote Amazon Basin area with the bases of supply on the western side of the Andes. After Shell, through Shell Co. of Ecuador, Ltd., obtained the original concession, drilling was held up by the war. Ecuador is considered to have one of the most favorable oil laws in Latin America.

During 1948 three wildcats were completed in widely separated parts of the concession. More recently, one rig has been in operation to complete the sixth well.

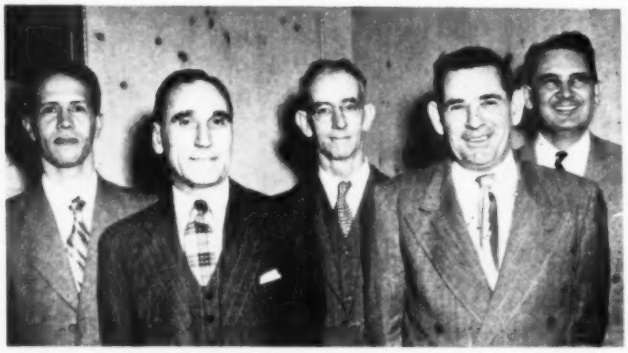
International Petroleum Co., Ltd., carried out an extensive exploration program in the coastal regions of Ecuador, withdrawing several years ago after drilling about 20 wildcats over a period of 6 years. Manabi Exploration Co., Inc., a Texas company, is now exploring coastal Ecuador. Ecuador's present production is confined to Ancon Peninsula, amounting to about 7,200 bbl. daily, mostly by Anglo-Ecuadorean Oilfields, Ltd.

Imports Restrictions

The Mexican Government is prohibiting the importation of gasoline at Rio Grande River points whenever it is found that Petroleos Mexicanos is able to supply those areas.

Under the provisions of a government decree in Mexico City, Pemex is to notify the Mexican finance minister when it is not able to supply the border markets. The minister then instructs the customs houses at Nuevo Laredo, San Pedro Roma, Reynosa, and Matamoros to permit importation of petroleum products until Pemex is again able to supply the areas.

Mexico has long depended upon some imports from the United States to supply northern areas remote from Pemex refineries. The country, however, faces a dollar-shortage problem.



VISITORS.—Foreign guests at the February meeting of the Houston Nomads are, front row, Alberto Landoni, Yacimientos Petroliferos Fiscales, Buenos Aires, Argentina, and T. R. Wilburn, Petroleos Mexicanos, Mexico. Back row, Luis Messone, YPF, Buenos Aires; C. F. Ferrell, Gulf Oil Corp., Kuwait; and Ray Kail, manufacturers' representative, Mexico.

MIDDLE EAST

Offshore Study

Arbitration Panel ponders extent of I.P.C. concession

A THREE-MEMBER private arbitration panel now has under study the question of whether the concession granted the Iraq Petroleum Co., Ltd., organization in 1935 by the Sheikh of Qatar includes territorial waters and if so, to what extent.

The decision is expected to be of considerable significance not only in the immediate case of Qatar but also for its effect on the various other questions that have arisen in the Persian Gulf concerning offshore boundaries of existing concessions.

The Qatar arbitration came after Superior Oil Co. some months ago negotiated a concession with the Qatar sheikh for the offshore development. Iraq Petroleum considers that its earlier concession over the entire sheikhdom includes these territorial waters.

The Superior contract is subject to existing rights, and the matter was placed before three private arbiters as provided in the I.P.C.-Qatar contract. One arbiter is appointed by each side; the third is Lord Radcliffe, British jurist and attorney.

A recent report from Cairo said that the decision in the arbitration is expected to be announced in London, probably in the next month. Hearings were held over a period of several weeks in Qatar.

Other boundary questions in the Persian Gulf still await settlement. The question of the seaward extent of two of the concessions held by I.P.C. on the Trucial Coast sheikhdoms is now on its way to arbitration. These sheikhdoms are those of Abu Dhabai and Dubai.

Yet to be determined, and not a direct part of the I.P.C.-Qatar arbitration, is the government-level question of the exact boundary between Qatar and Bahrein. This has been under negotiation several years and a tentative line was decided on and passed to the British Foreign Office, which exercises jurisdiction over these areas. The boundary between these sheikhdoms and Saudi Arabia also is undetermined. Since Saudi Arabia is an independent kingdom, this problem will involve international negotiations.

The exact terms of the Superior concession with Qatar for offshore rights have never been fully disclosed. The company is reported to have carried out preliminary exploration.

© Milne

Vice President

T. S. Johnston now with Interprovincial Pipe Line

THOMAS S. JOHNSTON, who recently was named a vice president of Interprovincial Pipe Line Co., Toronto, has had more than 20 years' experience in the transportation and marine-shipment phase of the petroleum industry.

Joining Standard Shipping Co. in 1928 after graduation from Williams College, Williamstown, Mass., Johnston later went with Lago Oil & Transport Co., where in 1941 he became assistant manager of the marine department at Aruba, N. W. I. A year later he was loaned to Standard-Vacuum Oil Co. as an assistant manager of the marine department.

In November 1944 Johnston went to South America to study equipment on the Magdalena River in Colombia, and also worked in Ecuador and Peru.

Early in 1945 he returned to Canada, where he was named assistant manager of Imperial Oil, Ltd.'s marine department. He was later appointed manager of that department.

At the time of joining Interprovincial Pipe Line, Johnston was serving as assistant to the vice president in charge of transportation and supply for Imperial.

J. L. White, Jr., former petroleum engineer at Falfurrias, Tex., for Magnolia Petroleum Co., has been named district petroleum engineer at Shreveport.

W. C. Dahlman, district manager and gas engineer for Houston Natural Gas Corp., Beeville, Tex., was recently awarded the "President's Cup" for outstanding leadership and distinctive accomplishments. The cup was awarded by **Frank C. Smith** of Houston, president of the corporation.

John Dumont, Texas University graduate, has been added to Pure Oil Co.'s geological staff at Abilene, Tex., and **George Olsen** has been transferred from Tulsa to Fort Worth.

J. B. Godwin, process supervisor, Magnolia Petroleum Co., Beaumont, has been named to the newly created position of chief process supervisor.

Albert E. Miller, assistant to the vice president in charge of research and development, Sinclair Oil Co., and **C. A. Neusbaum,** assistant director of standard inspection laboratories for Standard Oil Development Co., will be named guests of honor in June when the American Society for Testing Materials Committee D-2 on Petroleum Products and Lubricants holds its annual dinner. Miller is cited especially for his work in helping to organize and serving on the Technical Committee on Aviation Fuels. Neusbaum, who heads various committees, is a member of the advisory committee for D-2.

R. S. Pirocmov has been named manager of the technical service division, Esso Standard Oil Co., Bayway, N. J., refinery. **E. D. Juterbock** has succeeded to assistant manager of the division and **F. E. Walsh** now heads the chemical refining section.

R. V. Melreit, formerly an engineer in Standard Oil Co. (Ohio) manufacturing department, has been named to the newly created post of technical representative for the aviation-sales department.

E. G. Dobson, formerly senior petroleum engineer, has been made chief petroleum engineer of Texas Petroleum Co., Venezuelan division, with headquarters in Caracas.

John F. Walton, Jr., who recently resigned from a management position in the sales department of Gulf Oil Corp., has been made a member of the Gulf board of directors. Walton joined Gulf in 1940.

George Ethridge, Meridian, Miss., has been appointed by **Lt. Gov. Sam Lumpkin** to fill the unexpired term of **Walter G. Johnson, Jr.,** who recently resigned from the Mississippi State Oil and Gas Board.

L. L. Rone, tool pusher for Kerr-McGee Oil Industries, Inc., at Lusk, Wyo., has been transferred in a similar capacity to Powell, Wyo.

H. W. Haight, a vice president and director of Creole Petroleum Corp. since June 1946, has been elected executive vice president of the company. Haight has been in the oil industry since May 1927 when he joined Cia. Transcontinental de Petroleo, S. A., an affiliate of Standard Oil Co. (N. J.) as a torsion-balance helper. He subsequently served as geologist with the same company and in 1937 was transferred to Standard Oil Co. of Egypt as field superintendent. A year later he became manager and chief geologist of that company. He joined Creole in Venezuela in 1945.

Frank C. Kallina, formerly with the CAM Corp., is now serving as junior geologist for Lockhart Oil Co., Corpus Christi.

Frank A. Terry, scout for Tide Water Associated Oil Co. at Jackson, Miss., has been transferred to Midland, Tex., in the same capacity. **William E. LaRoche** has rejoined the company on the Kilgore, Tex., engineering staff, and **Charles M. Wilson** has rejoined the firm as associate engineer in the gas unitization department at Houston.

Floyd E. Suder, Jr., reservoir engineer at Eureka, Kans., for Ohio Oil Co., is now serving in that capacity at Tulsa.

Norman Bellinger, petroleum engineer at Lake Charles, La., has been

NEW OFFICERS.—Officers of the newly organized South Texas Geophysical Society, with headquarters in San Antonio, Tex., are, left to right: P. E. Narvarte, consulting geophysicist, president; T. L. Allen, Petty Geophysical Engineering Co., vice president; and John F. Imle, Petty Geophysical Engineering Co., secretary-treasurer.

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moved to the Drumright, Okla., area, where he will serve in the same capacity.

Ira H. Cram, Houston, vice president in charge of exploration for Continental Oil Co., has been appointed to the newly created position of vice president in charge of the company's production department. He will continue in his position as exploration vice president. **O. L. Fisher,** assistant manager of the production department, has been named assistant regional general manager, southern region, Houston. In his new position he will assist in direction of Continental's operations in Texas, Louisiana, New Mexico, Arkansas, and Mississippi. Fisher will be succeeded by **H. H. Hinson,** chief production research engineer.

IRA. H. CRAM

O. L. FISHER

H. H. HINSON

Richard W. Hillyer, production engineer at Seminole, Okla., for Carter Oil Co., is now serving at Shreveport, La., as division reservoir engineer.

Frank D. St. Hilaire, formerly inspection coordinator for the Lummus Co., has been appointed project engineer on the Trans-Arabian pipe line for Graver Construction Co., and will soon leave for the Middle East, where he will take up his duties in Saudi Arabia, Syria, Trans-Jordan, and Lebanon.

Ben D. Donnell, Jr., Continental Oil Co., has been elected president of the North Texas Oil Scouts Association. Others elected include: **Gregg Morris,** Standard Oil Co. of Texas, and **Max Robinson,** Superior Oil Co., vice presidents; **Bert Stovall,** Pure Oil Co., secretary-treasurer; and **Phil Miller,** Gulf Oil Corp., editor of the group's year book.

Damon P. Swain, Jr., is now serving as junior mechanical engineer for Stanolind Oil & Gas Co.'s Stano Gasoline Plant at Ulysses, Kans.

F. S. Williams and **Dan J. Kornfeld,** both of Wichita, have formed the W&K Pipe Line Co., Inc., and will build and operate a gas-gathering system in the Coons field of McPherson and Marion counties, Kansas.

B. D. Cox, Houston, has been appointed assistant manager in charge of operations at Shreveport for Magnolia Petroleum Co.

Martin G. Egan, Superior Oil Co. geologist, has resigned to enter independent consulting work, and has established offices in Evansville, Ind.

Floyd K. Beach, formerly engineer with the Petroleum and Natural Gas Conservation Board of Alberta, has retired and will open offices as a consulting engineer. Beach, who was with the Alberta Department of Lands and Mines previously, is a member of the Engineering Institute of Canada and has served as chairman of the branches at Calgary and Edmonton.

G. D. Craighead, tool pusher for Penrod Drilling Co. at Greydon, La., has been transferred in the same capacity to Houma, La.

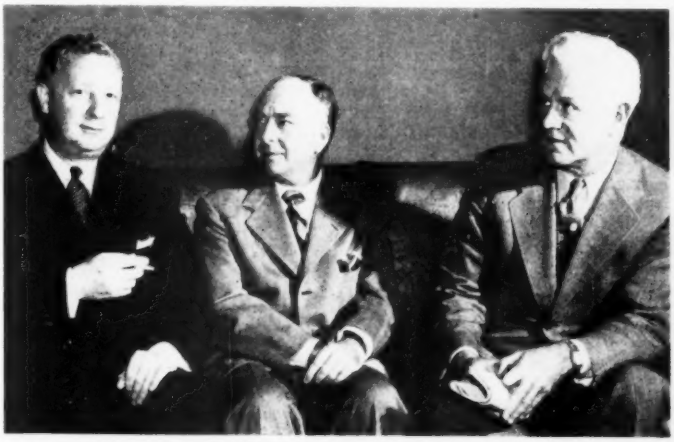
Sam Bear, Shell Pipe Line Corp. division superintendent in the Wasson-Hobbs, N. M., division, has gone to Caracas, Venezuela, to assist a Shell Group affiliate company with construction of the "Steep Inch" pipe line from the coast to Caracas.

Cloyd R. Wallace has been named assistant manager of The Texas Co.'s geophysical division, Houston. A graduate of the University of Missouri, Wallace joined the company at Houston as an assistant computer in the geophysical division in 1934. He was transferred to California in 1934, and was made party chief in 1936. He was named supervisor of field operations in 1943, and in 1948 was named assistant to the division manager.

Fred C. Bauchens, Midland, Tex., has been appointed manager of Toklan Production Co.'s Midland district. He formerly was with Phillips Petroleum Co.

Frank P. Donahue, formerly head of the oil-loan department, National Bank of Commerce, Houston; and **Joseph B. Zick,** formerly landman for Danciger Oil & Refining Co., Fort Worth, are now associated with Alec M. Crowell, natural-gas consultant, in New Orleans.

J. B. Miller, graduate of the University of Tulsa, has joined Gulf Refining Co. at Evansville, Ind., as geo-



STUDY SHELL EXPLORATION PROGRAM.—Above are officials of Shell Oil Co., who met in Tulsa last week to discuss the company's exploration and production program. Left to right: H. S. M. Burns, president, New York City; W. A. Alexander, area manager, Tulsa; and E. D. Cummings, vice president and head of the regional staff, exploration and production areas, Houston.

PERSONALS

logical scout for the Basin area, and **R. W. Schweigert,** formerly scout at Evansville, has been transferred in the same capacity to Calgary, Alta.

Dr. E. DeGolyer, Dallas, widely known geologist of the consulting firm of DeGolyer & MacNaughton, has been named recipient of the Sidney Powers Memorial Medal of the American Association of Petroleum Geologists. He will be presented the award at the joint annual meeting of A.A.P.G., Society of Economic Paleontologists and Mineralogists, and the Society of Exploration Geophysicists in Chicago in April. DeGolyer was awarded the medal in recognition of distinguished and outstanding contributions to petroleum geology.

James Breuill, founder of Frontier Oil Refining Corp., has been elected president of Kingwood Oil Co. **Asa Lee,** former president of Kingwood, has been elected chairman of the board of directors; **Ben J. Taylor** has been elected first vice president; **Wirt L. Harris** has been elected second vice president and general counsel; **L. K. McFarland** has been elected secretary-treasurer; and **John T. Livingston** has been elected assistant general counsel and assistant secretary-treasurer.

J. E. Matter, geologist for the western division of British-American Oil Producing Co., has been transferred to the Mid-Continent division as area exploration manager in charge of the North and West Texas and southeastern New Mexico areas, with headquarters at Fort Worth. He has been with the firm since 1941 and is a graduate of the University of California. **C. Harrison Cooper,** who for the past 4 years has served as district geologist for the Kansas-Oklahoma district, has been assigned to the North and West Texas, and southeastern New Mexico area, with headquarters at Abilene, Tex. **William Fleetwood** has joined the company's land and exploration department, with headquarters in Tulsa.

F. Vermersh, production engineer for Societe Cherifienne des Petroles (S. C.), Rabat, French Morocco, and **G. Lendriat,** drilling engineer, Paris, France, who represents the organization carrying on petroleum research in Algeria, are inspecting field operations at several points in Oklahoma, Texas, and Louisiana. They will visit California fields before returning home next month.

Donald E. Trott, petroleum engineer for Standard Oil Co. of Texas, Midland, has been transferred to Snyder, Tex., as drilling engineer.

G. R. Ledbetter has been named production foreman in the Mount Poso-Kern Front-Round Mountain areas of California for General Petroleum Corp., replacing **John W. Nobile,** who was named senior production foreman. **G. N. Windes,** production foreman in the North Midway area since 1933, has replaced Ledbetter as relief foreman for the East San Joaquin area, and **S. B. Durrette,** formerly production foreman in the coastal division, succeeds Windes at North Midway.

K. R. Tibbets has joined Warren Petroleum Corp., Tulsa, as senior contract representative. He formerly was with Sinclair Oil & Gas Co.

Lane Sartor, formerly with Barnsdall Oil Co., has been named district geologist at Shreveport for Pan-Am Southern Corp., a newly created position. **J. D. Aimer** is chief geologist, and **J. C. Thompson** is district geologist, with headquarters at El Dorado, Ark.

SHIFTS

John H. Greene, engineer, The Texas Co., Port Arthur, Tex., to New York City; **Alvin Wilson,** superintendent, Grand Bayou Oil Co., East Point to Harmon, La.; **Sam Phillips,** superintendent, Penrod Drilling Co., Marksville to Goodpine, La.; **Loyd Burson,** superintendent, Wheless Drilling Co., Paradise to Houma, La.; **L. D. Griffin,** superintendent, Wheless Drilling Co., Shreveport, to Carthage, Tex.; **D. C. Chambers,** superintendent, Wheless Drilling Co., Lafayette to Gonzales, La.; **V. R. Lay,** superintendent, Wheless Drilling Co., Ruston, La., to Jacksboro, Tex.

M. W. Sandefer, superintendent, Henderson Drilling Co., Humble to Batson, Tex.; **Noble R. Cook,** engineer, Stanolind Oil & Gas Co., Harlingen, Tex., to Thibodeaux, La.; **W. B. Oliver,** geologist, Humble Oil & Refining Co., Floresillve to Corpus Christi, Tex.; **Jesse L. George, Jr.,** geologist, Sohio Petroleum Co., Abilene, Tex., to Houston; **J. L. Deputy,** superintendent, Dickson Drilling Co., Baytown to Rockport, Tex.; **Loyle P. Miller,** engineer, Shell Oil Co., Corpus Christi to Garden City, Kans.

DEATHS

Robert Harkins, 70, head of the Harkins Pump Supply Co., Cleveland, died February 28. He was credited with several important discoveries in the oil-cracking process.

Charles W. Hadley, 73, Larchmont, N. Y., retired chairman of the manufacturing committee, Socony-Vacuum Oil Co., Inc., was killed in an automobile accident near Pecos, Tex., March 2.

Paul Doran, oil producer and drilling contractor of Vandalia, Ill., died in St. Louis March 2.

Ed J. Holland, 62, vice president of Union Oil & Refining Co., died in Abilene, Tex., February 24.

Robert Dee McCain, 29, Dallas oil operator, was killed in an airplane crash near Lawton, Okla., February 25.

W. G. Mundinger, 62, Louisiana accountant representative for Ethyl Corp., died February 28 in Baton Rouge.

J. H. Bingman, 73, for many years district superintendent for Pure Oil Co. at Mexia, Tex., died at Selma, Calif., February 21.

Max P. Stumpff, 70, formerly president of Imperial Oil & Development Co., and later head of Savage Oil Corp., died in Indianapolis March 1.

George H. McIntyre, formerly general manager for Continental Oil Co. at Fort Worth, died in Midland, Tex., February 17. He was a native of Warren County, Pennsylvania, and for 35 years was active in the Mid-Continent oil areas.

Walter Beckner, 74, former vice president and superintendent of Tuscarora Oil Co., Harrisburg, Pa., died February 25 in Trenton, N. J.

E. O. Allen, 80, former oil-field executive for J. S. Abercrombie Co., died February 25 in Houston.

Thomas M. Day, 55, chief engineer for Humble Pipe Line Co. at Mount Pleasant, Tex., died February 26.

James D. Pickell, 51, senior landman for Shell Oil Co. at Houston, died February 23.

Edwin Franklin Williams, 74, retired Gulf Refining Co. employe, Port Arthur, Tex., died February 17 at Beaumont.

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DIESEL-ELECTRIC *Drilling Barge*

Penrod Drilling Co.'s powerful new drilling barge pictured on its fifth location, a wildcat in Terrebonne Parish, Louisiana, being drilled for Placid Oil Co.

Left: J. T. Carmichael, chief engineer for Penrod, and John Spears, of The Oil and Gas Journal, discuss the new barge at a wildcat location in Terrebonne Parish, Louisiana.

Lined up for the Journal camera are P. L. Odum, maintenance superintendent; J. G. Enterkin, floor man; R. P. LeBoeuf, mechanic; T. M. Angell, floor man; T. C. Spann, floor man; J. W. Cantwell, derrick man; J. W. Pattillo, Jr., driller; and J. T. Carmichael, chief engineer for Penrod.

THE world's largest diesel-electric drilling barge is now in service for Penrod Drilling Co. in the swamps and bayous of South Louisiana. A war-surplus LST was utilized in the construction of the unusual barge which has over-all dimensions of 212 by 50 by 20 ft.—considerably larger than the conventional submersible swamp barge.

The powerful new rig generates a total of 1,800 kw. with 1,500 kw. available for drilling and 300 for auxiliary purposes.

In addition to its size and power, the Penrod rig has a number of interesting and unusual features. The five major features are as follows:

1. A 136-ft. portable derrick is mounted on the barge proper. In case of a hurricane, the derrick can be laid down in a matter of minutes. The derrick is designed to withstand a 125-m.p.h. wind when erect, without the use of guy wires.

2. All drilling equipment and the crew quarters are contained on one barge rather than on two or three.

3. The barge can drill in 18 ft. of water in contrast to 12 ft. for most big swamp barges.

4. Very little time is required to position the barge and commence drilling operations. On the first well

drilled with the new unit, the bit started turning 1 hour after the barge had been set on bottom.

5. A unique bulk mud-handling system, with a capacity of 10-300 sacks hourly, has been installed.

The barge—Penrod's Rig 44—is currently making hole on its fifth well. The test is Placid Oil Co. 1 Tri-State Wholesale Grocery Co., in Terrebonne Parish, Louisiana. Scheduled depth for the hole is only 12,500 ft. although Penrod's barge is designed for drilling 16,000-18,000 ft.

Original Designers

Original design work on Rig 44 was done by C. M. Roberson, drilling superintendent for Penrod; H. E. Karpe, draftsman; and W. F. Dalton, president of Placid Oil Co. R. E. Dishman, engineer and safety director for Penrod, designed the electrical phases of the drilling equipment installation. J. T. Carmichael, chief engineer for Penrod, has spent a good part of his time on the barge since it was put into operation last May. Assistant drilling superintendent for the company is N. H. Hall, and G. D. Craighead is tool pusher on Rig 44.

Choice of an LST was greatly influenced by the fact that there was a steel shortage at the time. Also, an LST, with its ½-in. steel hull plate, provides greater structural strength than normally found in a submerible drilling barge.

Roberson and Dalton were also greatly interested in the advantages of having all equipment on one barge as against two barges, which is more conventional. They felt that they could move and start drilling faster than with a two-unit setup. In addition, towing charges are obviously less and a minimum amount of dredging is required with one barge than with two.

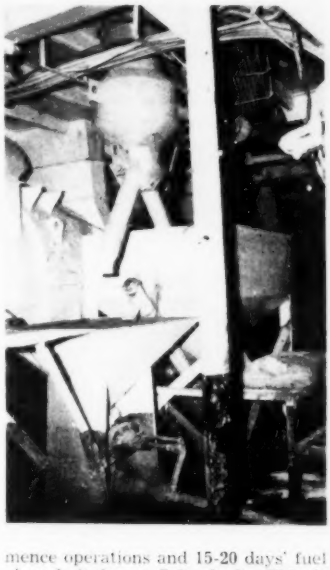
Penrod plans to use its new rig as an experimental rig much as Humble Oil & Refining Co. does its Rig 30, which has been described in past issues of The Oil and Gas Journal. New items, which the company wants to test prior to installation on its 26 land rigs, will be installed on Rig 44.

Rig 44 marks another departure from the use of steam rigs for drilling in the swamps and marshes of Texas and Louisiana. The increasing price of natural gas has been the important factor in this switchover. Diesel fuel is readily available in the area because of the large numbers of marine engines used in the fishing industry.

Despite its size, Penrod's Rig 44 has about the same draft as a conventional barge with the same drilling capacity. Unloaded, the barge has a draft of 6 ft. With enough drill pipe to commence operations and 15-20 days' fuel aboard, it has a 7-ft. draft. This is about standard when the rig is moving from one location to another.

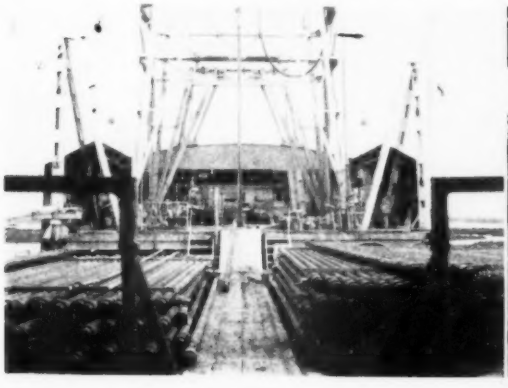
The bulk mud-handling system on the barge, which was mentioned

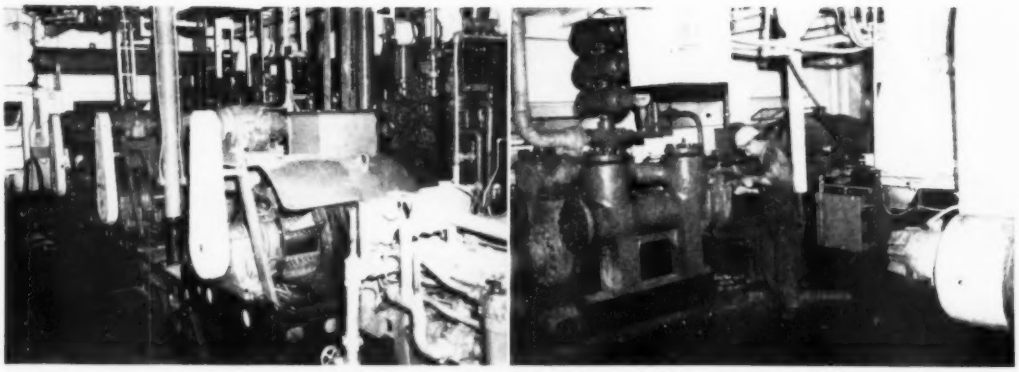
Above: Weighting material is brought out to the drilling barge in an air-activated storage tank (capacity, 325 sacks) which can be seen on the forward end of the cargo barge. The bulk mud is moved, by the use of air, from the storage tank to dry mud bins aboard the barge.



Right: Rig 44's unique bulk mud-handling system normally delivers the mud to the hopper in the left of the picture. However, if smaller quantities are desired (0-10 sacks) it is diverted to the hopper on the right which has a variable-speed feeding device.

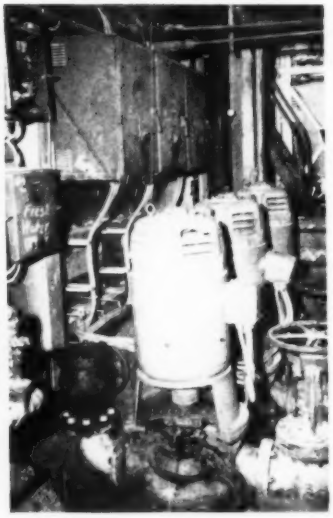
Left: This shot from the crew quarters shows the pipe racks and drilling floor. The racks are long enough to accommodate 45-ft. casing. Right: This large electric control panel is necessary to handle the 1,800 kw. generated by Penrod's Rig 44. The rig has three main generators for drilling, rated at 500 kw., and three auxiliary generators of 100-kw. capacity. The main generators are driven by three 715-hp. diesels and the auxiliary generators by three 152-hp. diesels.





Left: The mud pumps are directly connected to the 650-hp. electric motors which drive them. The pumps are equipped with pulsation dampeners, as can be seen in the picture. Right: These three 715-hp. (at 720 r.p.m.) diesels are each directly connected to 500-kw. generators (230 volts d.c. and 2,280 amp.). G.E. amplydine exciters mounted above main generators control speed of any one of the four electric drilling motors connected to each generator.

earlier, is an extremely interesting feature. It is being used to handle weighting material, as this is the additive used in the most quantity.



Above: To refloat the barge after a well has been completed, the 14 ballast tanks are emptied by these three ballast pumps. The pumps have a capacity of 1,500 g.p.m. each.

Other additives are handled sacked and admitted to the mud stream through a hopper with a variable-speed feeding device. The bulk system is designed to handle from 10 to 300 sacks per hour. It is so designed that, if it is desired to add smaller quantities, the hopper normally used for other additives can be employed. This hopper has a capacity of 25 sacks.

The bulk system depends on a screw-type conveyor and air to move the weighting material from place to place. The bulk mud is brought out to the drilling barge in an air-activated storage tank with a 250-cu. ft. (325-sack) capacity. It is then moved, by the use of air, from the storage tank to dry mud bins aboard the barge. The eight bins have a storage capacity of 4,000 sacks of weighting material.

From the storage bins, the mud is selectively removed by means of air-operated slide gate valves and a screw conveyor to a dry-mud transport pump. The pump blows the bulk material to a hopper where it is mixed with the mudstream. The over-all system is operated by one man at a central control panel. A dust collector has been installed to eliminate the nuisance of contaminated air while the blower system is in operation.

The bulk mud-handling system has been working so well that Penrod is thinking about adapting the system for its 26 land rigs. Mud handling has always been a time-consuming process, at least, in conventional drilling operations. Penrod's development may well point the way toward more efficient mud handling in the drilling industry.

In line with its idea of using Rig 44 for experimental and test purposes, Penrod is currently experimenting with several ideas (in addition to the bulk mud system just described). Among these are a crown-block warning system that sounds a horn when the blocks reach a predetermined point in the derrick. An "electric eye" is used to detect the blocks. Another test under way is the use of a special type of bit for cutting surface hole. It is planned to try "jet" bits in the near future. The rig has a large amount of available pump horsepower, so Penrod engineers feel that

(Continued on page 101)

Right: These three speed boats transport personnel and supplies to the drilling location. The tool pusher's boat (on the left) is equipped with a short-wave radio. Other radios are maintained on the LST, in the tool pusher's car, and at the shore base.

FLOW OF GAS IN PIPE LINES

. . . considering deviation from ideal gas laws

by Henry C. Owen, Jr.

THE equations used by many engineers to calculate isothermal flow of natural gas in transmission lines disregard the deviation of the gas from the ideal gas laws. These equations are still used because of their relative simplicity, although the deviation is usually significant at the operating pressures now used.

If the operating conditions on a pipe line remain constant, the effect due to deviation will be constant and can be absorbed in the pipe-line efficiency term in an equation which disregards deviation. However, operating conditions on a line usually change in time so that a pipe-line efficiency obtained under one set of operating conditions will not apply to another because of the change in the effect due to deviation. It is believed that the use of Equation 4 to calculate isothermal flow of gas evaluates the effect of deviation from ideal gas laws very accurately and is almost as simple to use as most flow equations now in use.

The following equation for isothermal flow of gas in pipe lines represents a revision of Equation 12a derived by Clinedinst[1] in his article:

$$Q = 54.831 \frac{Z_a T_a}{P_a} d^{2.5} \left[\frac{\int_{P_2}^{P_1} \frac{P}{Z} dP}{fGTL} \right]^{0.5} \quad (1)$$

where

- Q = gas flow rate in standard cubic feet per day
- Z_a = compressibility factor at standard temperature and pressure. This is approximately one and may be eliminated from the equation
- T_a = standard temperature in degrees Rankine (°F. + 459.6)
- P_a = standard pressure in pounds per square inch absolute (psia.)
- d = inside diameter of pipe in inches
- P_1 = upstream pressure in psia.
- P_2 = downstream pressure in psia.
- Z = compressibility factor: 1/Z = Y, the superexpansability factor
- f = coefficient of friction. A value of f four times as large as the one used here was used in Clinedinst's article
- G = specific gravity of the gas referred to air
- T = temperature of the gas in degrees Rankine (°R.)
- L = length of pipe line in miles

In addition to the usual assumptions of steady isothermal flow in a level pipe line, a constant or mean value of f, and a negligible kinetic-energy term, the equation of state which considers deviations from the ideal gas laws in terms of the compressibility factor Z was used in deriving Equation 1.

In order to calculate the amount of gas purchased or delivered by a natural-gas transmission company, the variation of the superexpansibility factor Y with pressure and temperature is usually determined. Curves which show this variation for almost all natural gases transmitted in pipe lines at present-day operating conditions of temperature and pressure are practically straight lines passing through a Y value of one at a pressure of approximately 15 psia., when lines of constant temperature are drawn showing Y as a function of pressure.

A typical example of the type of curve used by natural-gas transmission companies is given in Fig. 1; in Fig. 1 the supercompressibility ratio N is defined by the equation:

$$N = Y - 1 \quad (2)$$

Another example is shown in Fig. 1-A, Part 2 of Bulletin TS-354, published by the California Natural Gasoline Association. This bulletin also includes data on methane given in Fig. 3-C, Part 1, which shows that at present-day operating conditions of temperature and pressure there is a straight-line relationship between Y and pressure at a constant temperature; this figure also shows that the methane deviation curves change from a positive slope to a negative slope at a pressure of about 2,000 psia.

Henry C. Owen is technical service engineer with Texas Gas Transmission Corp., Owensboro, Ky., which company he joined last June. He received his B.S. degree in chemical engineering from Texas A. & M. in 1942, his M.S. in chemical engineering from Illinois Institute of Technology in 1949, and a master of gas technology from Institute of Gas Technology also in 1949. Prior to joining T.G.T., he worked for 5 years in the chemical industry.

It has been observed that occasionally when projections were made of the constant-temperature lines at or near pipe-line operating conditions, they did not intersect at the Y value of one at a pressure of approximately 15 psia.; but in any case the isothermal relationship of Y to the absolute pressure P may be expressed as follows for the portion of the curve which is a straight line:

$$Y = KP + C \quad (3)$$

where

- K = slope of the Y vs. P line at constant temperature
- C = point of intersection of the Y vs. P line on the "Y" axis. In most cases the value of C lies between 0.995 and 0.998

This equation is used to solve the preceding integral as follows:

$$\int_{P_2}^{P_1} \frac{P}{Z} dP = \int_{P_2}^{P_1} PY \, dP = \int_{P_2}^{P_1} (KP^2 + CP) \, dP$$

$$= \frac{K}{3} (P_1^3 - P_2^3) + \frac{C}{2} (P_1^2 - P_2^2)$$

This solution is substituted into Equation 1 and the following equation results:

$$Q = 38.7744 \frac{T_a}{P_a} d^{2.5} \left| \frac{C\,(P_1^2 - P_2^2) + 0.666667K\,(P_1 - P_2)}{fGTL} \right|^{0.5} \quad (4)$$

The values of K and C may be determined very accurately from typical Y vs. P curves. If such curves are not available, the values of K and C at each temperature can be determined from two values of Z taken from a generalized compressibility factor chart in the range of operating pressures; but the accuracy is usually much less.

It is believed that the methods for determining the value of the integral in Equation 1 presented by Clinedinst[4] and by Joffe[5] are less accurate than the method using the Y vs. P curves because of the inherent inaccuracy of the generalized charts presently available.

Biddison[3] presented a correction factor for deviation in his Equation 1, Appendix III, which is based on the following relation between Y and P at constant temperature:

$$Y = 1 + KP^n \quad (5)$$

When the value of n in this correction factor is one, the incorporation of this factor in his general flow Equation 1, which does not consider deviation, results in Equation 4 of this article with the value of C being one. In the same article he also recommends using another correction factor, his Equation 4, Appendix III, which results when the value of n is one. The use of this correction factor also results in Equation 4 of this article with the value of C being one; and is approximately equivalent to using the average Z to integrate Equation 1 where the mean value of Z is taken at the mean pressure P_m, which is defined as follows:

$$P_m = (2/3) \frac{P_1^3 - P_2^3}{P_1^2 - P_2^2} \quad (6)$$

A comparison between the method using values derived from a typical supercompressibility factor curve in Equation 4 and some other methods now in use is given in the following problem, which is typical of those encountered in the natural gas transmission industry. In these solutions, all the variables except the effect due to deviation from the ideal gas laws are considered constant.

Problem.—Determine the daily capacity of a pipe line consisting of 50 miles of 26-in. o.d. pipe having an i.d. of 25.44 in. and a coefficient of friction f equal to 0.00263. The natural gas has a specific gravity of 0.6124 and the following analysis:

Component	Mol %
Carbon dioxide	0.90
Nitrogen	1.38
Methane	91.75
Ethane	4.31
Propane	1.08
Isobutane	0.17
n-Butane	0.21
Isopentane	0.02
n-Pentane	0.02
Hexanes	0.11
Heptanes plus	0.05
	100.00

Data on this actual gas were used to prepare Fig. 1.

The standard pressure and temperature at which the gas is measured are 15.025 psia. and 60° F., respectively. The temperature of the flowing gas is 60° F., the upstream pressure P_1 is 825 psia., and the downstream pressure is 565 psia.

A. Method using values from Fig. 1 in Equation 4:

The value of K and C in Equation 3 are first determined from two values of Y and P so that the equation for the 60° F. constant-temperature line is:

$$Y = 0.0001644\,P + 0.9976$$

Then by substituting these values of K and C in Equation 4, the daily flow rate Q is calculated to be 429,740,000 standard cubic feet per day.

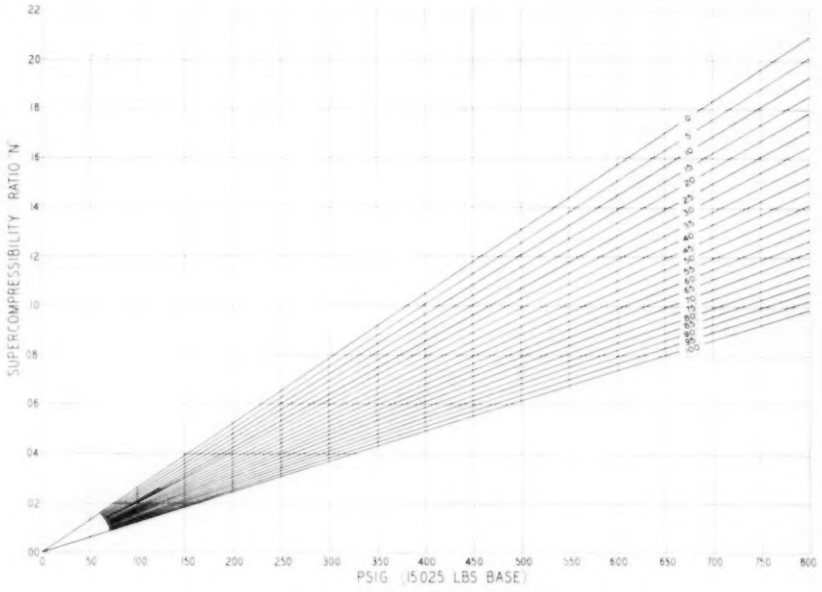


Fig. 1—Typical compressibility factor curve.

B. Method using values from a generalized compressibility factor chart in Equation 4:

From the analysis of the gas, the pseudocritical pressure equals 674.0 psia. and the pseudocritical temperature 358.4° R. The reduced temperature equals 519.6/358.4 = 1.450; the reduced pressure at P_1 equals 825/674 = 1.224; and the reduced pressure at P_2 equals 565/674 = 0.838. Values of Z at these two points are taken from the generalized compressibility factor curve prepared by G. G. Brown[6] in order to solve for the value of K and C in Equation 3.

$$K = \frac{\Delta(1/Z)}{\Delta P} = \frac{1}{260}(1/0.864 - 1/0.905) = 0.0002019$$

Then, C = 1/0.864 − (0.0002019) (825) = 0.9906. By substituting these values in Equation 4, the daily flow rate is calculated to be 433,160,000 standard cubic feet per day.

C. Method using mean compressibility factor to integrate Equation 1:

Using a mean value of Z to integrate Equation 1 results in the following equation:

$$Q = 38.7744 \frac{T_a}{P_a} d^{2.5} \left(\frac{P_1^2 - P_2^2}{fGTLZ_m} \right)^{0.5} \quad (7)$$

(Continued on page 101)

in the Permian Basin

by Bill R. Weaver*

ACID has been used in the Permian basin on almost all the known producing horizons, with varying results. Little acid has been used on the Grayburg because of poor results due to the presence of sand and anhydrite, and on the Pennsylvanian reef limestones since excellent natural flow is obtained in most cases. The San Andres zone is treated far more than any of the others in the area and in general with far better results.

The most widely treated zones are limestone and dolomite. A few other formations have been known to have been treated, but only on special occasions, such as the treatment in one instance of a chert horizon. Descriptions of the zones and the names of the fields where they occur are listed in Table 1.

Several types of acid are used. These might be classified into two divisions: (1) regular inhibited 15 per cent impure hydrochloric acid, and (2) additive chemical, which includes low-surface-tension material, emulsion preventive, intensified for slow-acting dolomite, and mud acid for sand pays and mud cake on limestone or dolomite.

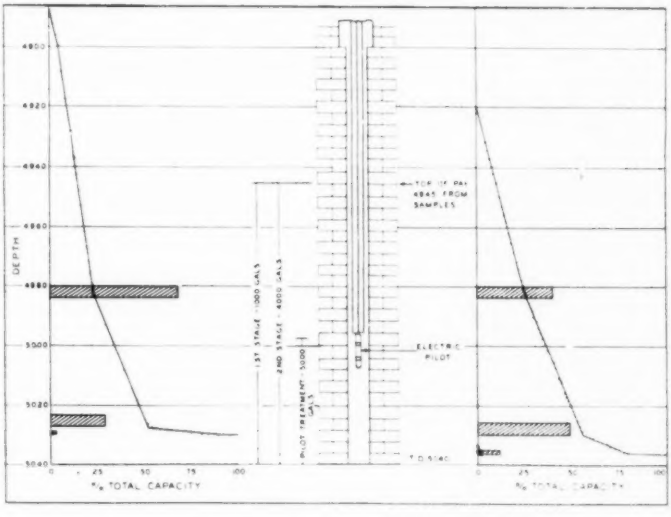
Acidizing function is to break down the formation and allow the acid to channel out in a radial horizontal direction from the bore hole, and increase the porosity and permeability of the formation near the bore hole.

A number of acid-oil emulsion tests have been made in which each of the aforementioned acids was emulsified with an equal quantity of crude oil from the various fields in West Texas and New Mexico. In each case, it appeared that the consistency of the emulsion was unaffected by the acid concentration.

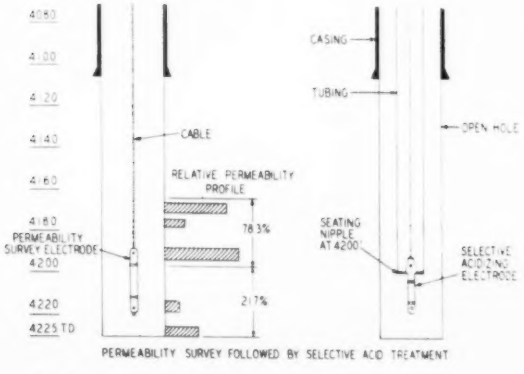
Due to the greater concentration of acid, 15 per cent acid will spend itself more rapidly than will the 7½ per cent concentration. Five minutes after 1,000 gal. of 15 per cent hydrochloric acid enters the formation, it will have dissolved approximately 900 lb. of calcium carbonate. A 7½ per cent hydrochloric acid will, in the same time, dissolve approximately 400 lb.

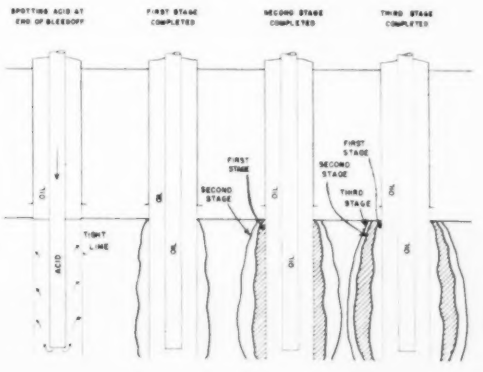
Passage of 15 per cent acid through small channels will enlarge their diameter and increase the permeability and porosity adjacent to the channel much more than will the 7½ per cent. A 7½ per cent acid, due to

*Tide Water Associated Oil Co., Midland, Tex. Presented at annual joint meeting of Texas sections of A.I.M.E., A. & M. College of Texas, College Station, Tex.



Right: Percentage capacity (permeability) of different pay zones can be made more uniform by selective acidization, in stages. Left, below: Here the relative capacity, or per cent of total permeability of pay zones, has been determined by electric pilot survey. Apparatus for selective acidization also is shown. Below, right: Successive steps in three-stage acidization program.





its slow rate of reaction, will be forced under great pressure through small openings without enlarging the openings appreciably. The passage of the oil and acid through the small channels will tend to form an emulsion. The emulsion will possibly remain in a rather fluid condition as long as it is in motion.

Once the solution reaches a static condition, the emulsion may become much more viscous and will require more pressure to expel the fluid from the formation than was required to force it into the formation. Actually, the available pressure will be even less, therefore, the well will be slow to clean up. It appears possible, in some cases, actually to reduce the production of the well by this means.

With 15 per cent hydrochloric acid, a smaller volume will be required and consequently will be forced into the formation a shorter distance. It will enlarge the diameter of the channels and provide more gas to help expel the spent acid water than would be possible with 7½ per cent acid. Due to the speed of reaction, a 15 per cent hydrochloric acid will also increase the porosity and permeability near the well bore in channels than will lower concentrations.

Undesirable Effects of Acid

The undesirable factors which may result from an acid treatment are as follows:

Formation of an acid and oil emulsion, placing a "water block" in the formation, and dissolving material which may later be reprecipitated when the acid is completely spent.

Formation of acid and oil emulsions.—Emulsion tests should always be made with oil from new fields and pay zones to determine the best type of acid to use. It is nearly always possible to change some of the additive agents in the acid so as to either prevent the formation of an emulsion or to cause the emulsion, if formed, to have a viscosity equal to or lower than the viscosity of the original oil. The only time that emulsions prolong the cleanup time of a well is when they have a tendency to form a jell or sludge.

Placing a water block in the formation.—Water blocks can be prevented for the most part by using a low-surface tension acid. Almost all of the water should be purged from the formation in as short a time as possible. Spent or nearly spent acid may be pumped for quite a distance into a channel with a very small diameter and then remain in the formations and completely block the oil for a considerable length of time.

Dissolving material which may later be reprecipitated.—Anhydrite is sometimes dissolved and then reprecipitated as gypsum. Anhydrite is so inert to hydrochloric acid that only a very small quantity will be dissolved as long as there is a sufficient quantity of the more soluble materials available. However, it has its greatest solubility in concentrations of 9 to 10 per cent hydrochloric acid, which is possibly due to greater ionization. The solubility is greater in 7½ per cent than in 15 per cent hydrochloric acid.

Strong vs. Weak Acid

It may be concluded that 7½ per cent hydrochloric acid will have the same tendency to form emulsions and water blocks as will the 15 per cent concentrations. A well will probably be slower to clean up when using 7½ per cent hydrochloric acid and because of the greater volume and the fact that it dissolves fewer materials, and consequently has more time in which to form the damaging water block.

The weak acid requires 27 per cent more time for 7½ per cent acid to completely spend itself than it does for 15 per cent acid, and it requires approximately 100 per cent more time to inject the 7½ per cent into the formation because of twice the volume.

Intensified Hydrochloric Acid

Intensified acid is prepared by adding a reagent, which varies in

TABLE 1—NAME AND DESCRIPTIONS OF WEST TEXAS OIL FORMATIONS

Formation and field—	Formation description
Grayburg: North Cowden, Penrose, Eunice	Anhydrite, dolomite, red and gray shales, and bentonite (sandy dolomite); pin point to slightly more than pin point porosity.
San Andres: Goldsmith, Penwell, Levelland, Slaughter	Top "solid lime," tan and brown finely crystalline dolomite (not sandy) and minor amounts of anhydrite; pin point to cavernous porosity.
Clearfork: Fullerton, Robertson, Embar	Sand, brown cherty crystalline dolomite, in part sandy, layers of gray shale.
Wichita: Drinkard	Top Drinkard sand member (Tubbs sand); finely crystalline brown and gray dolomite with layers of dense to finely crystalline limestone and thin beds of black and green shale
Wolfcamp: Tippett, Shafter Lake, Macder, Skaggs Deep	Red and light green shale, sandstone (often Arkosic) and layers of dolomite and limestone.
Pennsylvanian limestone: Diamond M, N. Snyder	Reefs are usually crystalline limestone with pin point to cavernous porosity.
Mississippian limestone: N.W. Howard County	Silty, silicious, cherty, very finely crystalline limestone, generally glauconitic at the base.
Devonian: Wheeler, TXL, Fullerton	Crystalline limestone, sometimes silicious with abundance of chert.
Silurian limestone: Shipley, Fusselman, Wheeler, Dollar Hide	Medium to coarsely crystalline lime with some chert.
Montoya: Borden County	Finely crystalline lime with varying amounts of chert; often sandy at base.
Simpson: Atell, McKee, Sand Hills	Lithographic and finely crystalline limestone with interbedded limestone, shale, and sand.
Ellenburger: Embar, Keystone, TXL, Wheeler	Fine to medium crystalline dolomite (occasionally limestone) often sandy at base.

TABLE 2—PROPERTIES OF 7½ AND 15 PER CENT HCl ACID

	7½ per cent	15 per cent
Pounds of $CaCO_3$ dissolved per 1,000 gal. acid	889	1,843
Cu. ft. of $CaCO_3$ dissolved per 1,000 gal. acid	5.25	10.8
Cu. ft. of CO_2 formed per 1,000 gal. acid at S.C.	3,442	7,130
Viscosity of spent acid relative to water as 1.0	1.34	1.93
Reaction time on Permian dolomite:		
(a) Approximate time required for 50 per cent of acid to be spent	6 min.	5 min.
(b) Approximate time required for 90 per cent of acid to be spent	18 min.	12 min.
(c) Approximate time required for 100 per cent of acid to be spent	28 min.	22 min.

TABLE 3—RESULTS OF ACIDIZING IN WEST TEXAS

Field—	Well No.	Date of completion	Prod. before acid	Amount acid	Bbl. day prod. after acid
Adair	A1	2- 2-49	Trace	7,000	P. 87
Drinkard	A1	5-18-49	2 bbl. per hour	4,000	P. 231
	B1	3-19-49	Trace	8,850	F. 52.65
Levelland	A1	2-17-49	Trace	15,000	P. 27
	B1	1-26-49	1 bbl. per hour	10,000	P. 173
	C1	3- 7-49	No test	15,000	F. 54
	C2	5-20-49	2,000 ft. in hole	7,500	F. 583
Welch	A1		Trace	6,000	P. 59.7

TABLE 4—RESULTS OF ACIDIZING CLEARFORK FORMATION, FULLERTON FIELD

Clear Fork zone	Included interval (ft.)	Acid (gal.)	Productivity index before acid	Bbl. per day per lb. after acid	Productivity increase
First	6,750-6,950	8,000	0.076	0.198	2.60
Second	6,950-7,100	8,000	0.145	0.362	2.50
Third	7,100-7,250	8,000	0.250	1.690	6.75

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amounts with the companies using it, to 1,000 gal. of the hydrochloric acid base. The reagent reacts with a very small quantity of hydrochloric acid to form hydrofluoric acid and ammonium chloride.

The intensified acid speeds up the rate of reaction of the acid, increases the ratio of magnesium carbonate to calcium carbonate dissolved by the treating solution, and increases the permeability of the mud cake. The belief that intensified acid increases the permeability of mud cake is based primarily upon tests with mud acid. The permeability is increased from practically zero in some cases to 100 or more millidarcies by treating with mud acid.

The intensified acid increases cost of treatment. Intensifier, at the present time, increases the cost of the acid by $30-$35 per 1,000 gal. Hydrofluoric acid reacts with calcium carbonate to form calcium fluoride, a relatively insoluble compound.

In 1,000 gal. of intensified hydrochloric acid the reagent will react with 94.7 lb. of calcium carbonate. It will form approximately 74 lb. of calcium fluoride. The volume of calcium carbonate dissolved by the hydrofluoric acid is 0.559 cu. ft. The volume of calcium fluoride formed by the reaction is 0.373 cu. ft. The porosity volume gained by the reaction is 0.186 cu. ft. The calcium fluoride will occupy one-third less space than the corresponding calcium carbonate, thereby increasing the porosity of the formation by 33⅓ per cent.

Since the percentage of the hydrofluoric acid in the solution is so small, there will be only microscopic quantities of calcium fluoride formed. Since these small particles will not be bonded or attracted by the remaining formation, almost all of the precipitate should be washed into the well bore by the return of the spent acid. This will probably reduce the quantity of calcium fluoride left in the formation to a volume of 50 per cent or less of the total volume of calcium carbonate dissolved by this particular component of the treating solution.

Hydrofluoric acid, while having a relatively low ionization constant, has a particular affinity for attacking silicates and coagulatory drilling mud. It is very desirable that laboratory tests be conducted on new zones or on samples from wells in new fields to determine the type of acid to be used for best results.

Acid Inhibitor

Some difficulty has been experienced with acid inhibitors at high temperatures (200° F. and above). The inhibitors used sometimes do not give the necessary protection to the tubing because inhibitor efficiency decreases with increase in temperature, and high pump pressure places the tubing under stress, and stress corrosion occurs. Any metal under stress will corrode many times faster than stress free metal. Some inhibitors are believed to break down completely at some temperature between 225° and 300° F., and may not be recommended for temperatures above 185° F. or when the treating pressure is expected to be above 3,000 psi. When these conditions are expected, the volume of the treatment should be reduced so that the acid will not be in contact with the tubing for a longer period than 2 hours during any stage.

Also, when it is possible, it is recommended that the acid in the tubing be flushed with water after a treatment at high temperature and pressure conditions.

One of the acid-company laboratories has made the statement that two or three compounds have been tested and that the efficiency of the usual inhibitor has been increased considerably when used in conjunction with them at the above-mentioned abnormal temperatures and pressures.[1] Another acid company indicated that its inhibitor is of the inorganic type while all others apparently are of the organic type. This company states that this inorganic material is an excellent corrosion preventive at any temperature.[2]

Volume of Treatments

The amounts of acid used vary from a wash shot of 50 gal. to one-stage treatments of 30,000 gal. In Levelland and Slaughter fields, normal treatments range between 5,000 and 10,000 gal. with occasional 15,000-gal. treatments. In North Cowden, about 5,000 gal. are used on the San Andres and Holt pay zones. Most of the North Snyder completions are natural; however, some wash shots of 500 gal. of mud acid are employed. Adair field treatments are usually about 6,000 gal. In Welch field, 10,000-gal. treatments are common.

Treatments in McElroy field are usually unsatisfactory, possibly due to presence of some property of the oil which prevents the acid from coming into contact with the formation. In Wheeler field, most completions in the Ellenburger and Silurian are natural, but some 4,000-gal. treatments are used on the Devonian zone and occasionally on the Silurian formation.

Three 30,000-gal. treatments have been used experimentally in this area—one in Fullerton field and two in the Big Lake area. The results of the Fullerton field experiment were not satisfactory because of a very thin pay zone and a lack of oil—a much smaller shot would have created comparable production. However, the two shots at Big Lake materially increased production and were considered very successful. One 25,000-gal. treatment was completed recently in Upton County. The production from this well was increased from approximately 5 bbl. per hour to an average of 47 bbl. per hour.

As a general statement, reservoirs which have lower range of permeabilities, which consequently complete for small amounts of oil natural, are usually treated with an excess of 5,000 gal. Also, fields which have potential factor in determining allowable are often treated with large volumes of acid in order to secure maximum flush production on initial test. Wells in the higher range of permeabilities are sometimes completed with casing or liners through the pay zone, which often need 200-500 gal. wash treatment in order to make the wells natural permeability open to the bore hole. (See Table 3.)

Typical Acidization and Results

The most common acidization procedure employed is known as the Carr method. This involves filling the tubing and casing with oil, calculating the displacement necessary to spot the acid on the formation down the tubing, pumping acid down tubing and bleeding oil through casing to spot, holding acid in place with pressure on casing and flushing the tubing with oil. This procedure may be reversed (acid and load down casing) when attempting to keep acid off a lower zone. Low-capacity wells completed with cable tools are often casing swabbed until clean and the acid is immediately cascaded down the casing followed by enough load oil to displace the acid into the formation.

As a whole, acidization has been very beneficial in the Permian basin. Generally, tests are not made on wells in fields such as Levelland, Slaughter, Adair, and Drinkard prior to acidization. It is the usual practice to acidize these wells as this is necessary to produce oil in commercial quantities. Otherwise, these wells would be considered dry holes.

Reacidization and Results

Reacidization has been used to a great advantage in a number of cases in Wasson field, Yoakum County, Texas. Four wells on each of three leases were reacidized in 1941. A total allowable increase of 149 bbl. per day was obtained on the three leases with a total potential increase of 6,361 bbl. per day. The total net increase after allowing for shutdown days with approximately 99 bbl. per day. The average cost was about $6,000 per lease with payout periods ranging from 5 to 7½ months per lease.

Selective Treatments

It is often desirable that the chemi-

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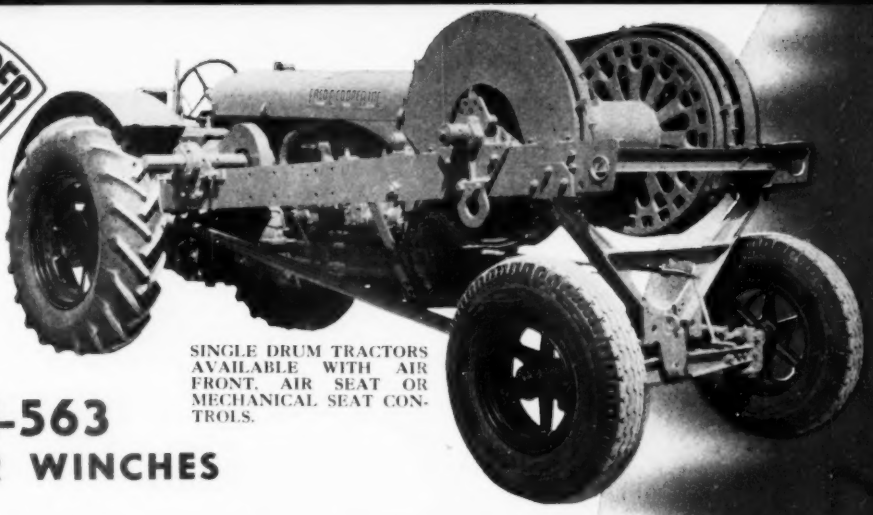

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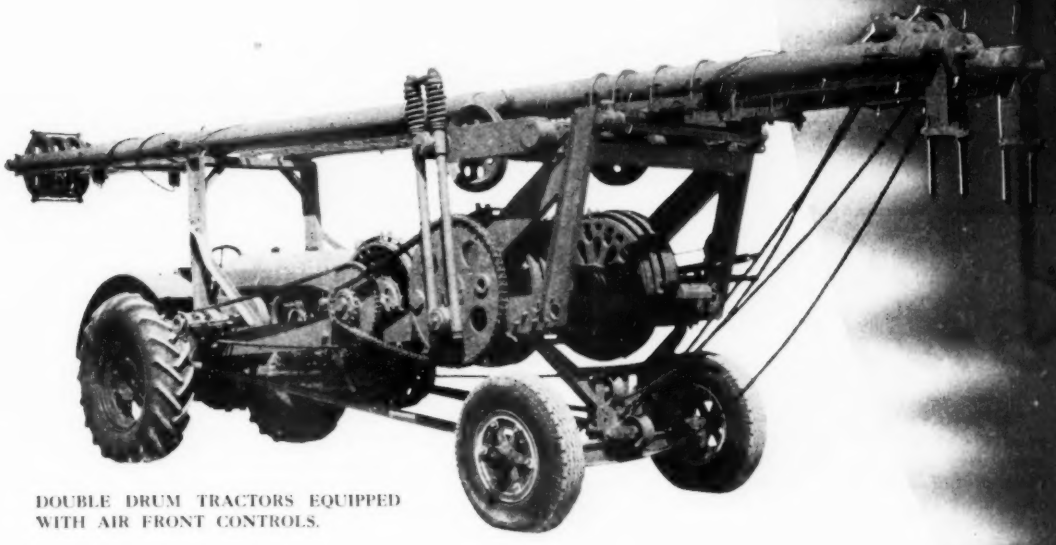

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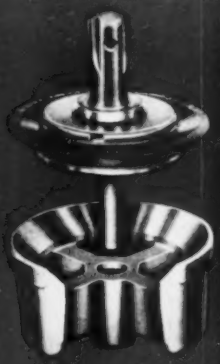

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cal be placed in a selected zone in order to produce the best results.

Variations of procedure that have brought about better results are use of packers, plugbacks, bridge plugs, pilots, and two-pump treatments. Packers set between two zones where effective shutoffs can be obtained have proved very successful. Bridge plugs and plugbacks are often used before and after treating lower zones to effect a shutoff from the upper zone.

Pilots are used to control the level of the acid in the hole. Two-pump treatments have proved very effective when the formations above the zone to be treated are not so permeable that they take oil in sufficient quantities to prevent the casing pump from keeping the hole loaded and thus allow the acid to rise above the desired point of application.

Occasionally, in an area where low bottom-hole pressure is a factor, some operators prefer to pump the acid down the casing and then use a casing swab for a more effective cleanout.

Some use the live oil load after a shut-in period and the consequent gas production as back pressure in the casing for keeping the acid in the proper zone during a treatment.

In some cases, a treatment known as "reverse compound" has been used successfully. This involves a large first-stage application and small subsequent stages. This provides a greater cleanout of impure residues in the beginning and is especially effective in impure-limestone and dolomite treatments. Treatments which progressively increase in size are more effective in pure limestone and dolomite zones.

Usual acid and shooting treatments are not competitive. The purer dolomite and limestone reservoirs respond to acidization, whereas, sand reservoirs or formations, such as the Grayburg, which is a sandy dolomite, react only to shooting.

Blankets

As a rule, blankets are not effective. Normally, the formation which is to be blanked off is of a nature that it is almost impossible to pump and locate properly a mixture which, when under pressure during an acid treatment, will not be lost in the zone. It is this condition that destroys the effectiveness of the blanket, and, in many cases, allows enough of the supposedly blanked-off zone to be exposed and thief the acid.

When blankets are used in the form of mud and jelly seal, one company with which the writer discussed the problem, recommended placing them by using a dump bailer. They are in favor of using temporary plugging material added to the mud or other fluids in the form of powder or

(Continued on page 95)

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EFFECT OF PLANT PROCESS Size ON Capital Cost

by Peter W. Sherwood

First costs of process plants and units are shown to follow the equation:

(Cost of plant of capacity A) = (Cost of plant of capacity B) $(A/B)^x$

where x varies between 0.58 and 0.82, and has an average value of 0.7. Occasional exceptions to this rule are noted, especially for high-pressure units and for very small plants, for both of which the exponential factor is considerably lower.

The author is with Koppers Co., Inc., research department, Pittsburgh.

ONE of the most helpful correlations in the preparation of approximate plant-cost estimates involves the use of so-called six-tenth exponential factor. This rule states that the price of similar process equipment is proportional to the six-tenth power of its size.

(Cost of equipment of size A) = (Cost of equipment of size B) $(A/B)^{0.6}$ (1)

Except in very small equipment sizes, this relationship has been found to apply for most types of units with surprising accuracy.[1,2] It is thus possible to estimate the first cost of process equipment over a fairly large size range, provided the price of one similar unit of any size whatever is known, as is often the case.

Another relationship of importance to the process engineer, but one which has so far not been properly explored, involves the effect of plant size on first investment. Such a correlation is especially needed for the preliminary selection of the most economic plant size.

Of the four major items which make up unit production costs, capital, and labor costs are the ones most significantly influenced by the size of the plant while the other two—raw materials and utilities—remain fairly invariant. The purpose of the present paper is to determine the rate at which plant investment varies as a function of design capacity. Application of the findings of this presentation should make it possible to make at least a preliminary evaluation of capital costs per unit production in plants of different sizes, without the time-consuming preparation of several plant cost estimates.

Probable Limits of the Cost Function

An approximation widely employed for the quick preparation of plant cost estimates assumes that the capital investment in the fully erected plant is proportional to the first cost of the uncrected equipment required for the process.[3,4]

(Total capital investment) = (K) × (Cost of equipment) (2)

The value for K varies between 3.1 and 5.3 depending on the type and, to a lesser extent, on the size of the plant under consideration. It embodies charges incurred for foundations, erection, piping, instrumentation, engineering, etc.

Combining Equations 1 and 2, it might be deduced that plant investment, just like equipment cost, is proportional to the six-tenth power of the capacity. This conclusion rests, however, on two erroneous assumptions. Firstly, it postulates that the factor K in Equation 2 is independent of plant size—an assumption which cannot be held correct. Secondly, it presupposes that increases in plant capacity are brought about solely by increasing the size of the process equipment and it excludes completely the possibility of duplication of equipment, which is, of course, a very common factor in plant enlargement.

If the variation in factor K (Equation 2) could be disregarded, plant enlargement by duplication of equipment would result in a linear relationship between plant cost and plant capacity.

Normally, large plants differ from smaller units in the existence of larger equipment as well as in the duplication of operating units. The extent to which the use of larger equipment is preferable to duplication depends on the nature of the operation, on the relative plant sizes, the requirements of the plant site, and a multitude of other individual factors. This mixture of methods for the enlargement of plants makes it therefore impossible to state a priori whether investment cost will be a simple exponential function of design capacity. If such a relation does exist at all, it will have the form:

(Cost of plant of size A) = (Cost of plant of size B) $(A/B)^x$ (3)

where $0.6 \leq x \leq 1.0$.

Selection of Plant Cost Data

Development of a correlation between plant size and investment cost

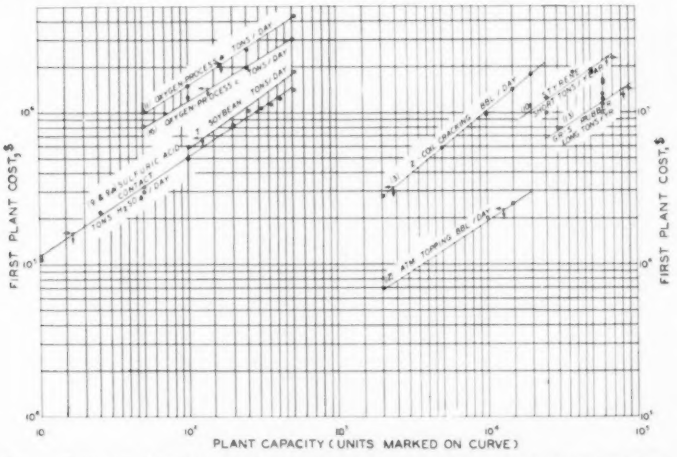

Fig. 1—Cost data plotted for Plants 3, 7, 9 and 9a, 10, 11, 12, 13, and 16. (Plant details given on pages 84 and 95.)

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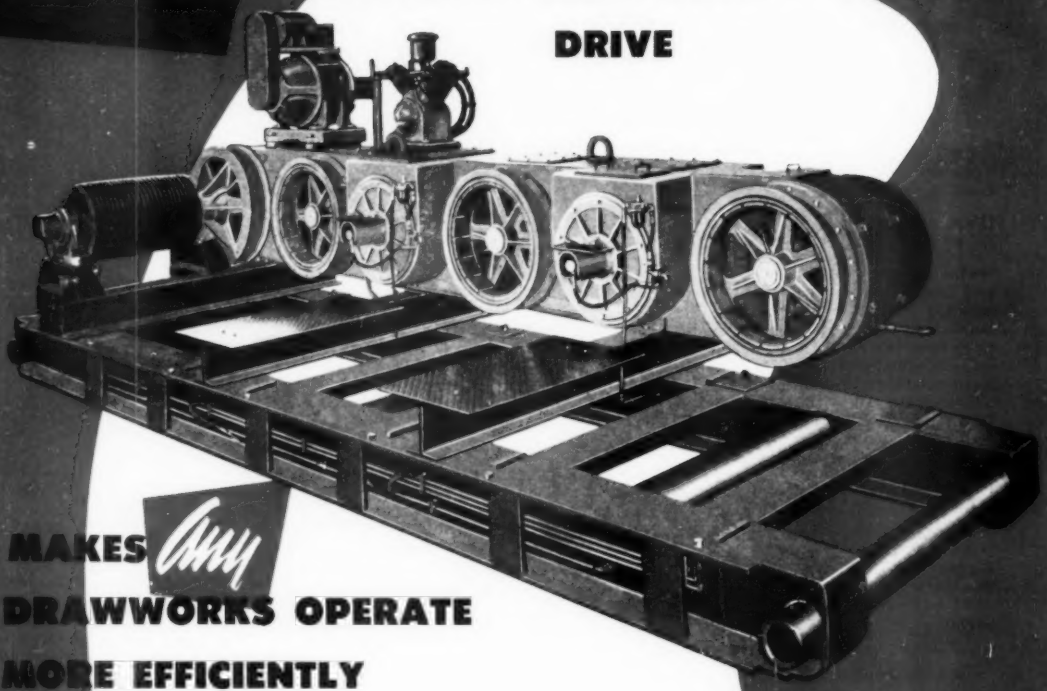

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must, of course, be empirical. Cost data on process, chemical, and oil refining plants of diverse character have been collected and first investment has been plotted in the accompanying curves as a function of capacity. In the case of each process unit, the first cost has been reduced to some common base year* in order to permit proper comparative evaluation without regard to variations in the construction cost index.

There are probably few entire plants in the country which have been constructed on a strictly comparable basis. Major differences exist even between plants of a similar character in such items as the existence of a water-cooling system, power plant, Dowtherm boiler, transformer station, waste-disposal system, and in many other service units. Moreover, plants which have some important process units in common, may differ radically in other significant construction and process aspects.

Again, a process unit may be located at an already-existing plant site in which case it has a considerable advantage in first cost over units which must be newly erected as an integral self-sufficient plant. Other variable factors, notably cooling-water temperature, soil conditions, and local construction labor cost enter into the price of the finished unit.

Another difficulty in obtaining comparative plant costs arises from the fact that storage provisions in large plants are quite commonly relatively smaller than in small process units. This is due to the fact that a large plant very often justifies the more frequent arrival of raw materials shipments and the removal of product at lesser intervals.

In selecting cost data for this comparative study, emphasis has therefore been placed on process units within large plants, preferably unencumbered by service plants (power, steam, water cooling, etc.) and storage facilities except where such units are inseparable from the process under consideration. Such inseparability may be encountered where the raising of byproduct steam is an integral part of the reactor cooling system, or where small storage systems between unit operations are essential to absorb flow fluctuations.

An attempt has, moreover, been made to include considerations of similar soil, climatic, and labor conditions in the selection of cost data. Wherever possible, the cost of piping outside the plant area proper has not been included.

By the present definition, a "process unit" is a plant or portion of a plant capable of carrying out at least one complete chemical transformation or physical separation, together with all the attendant accessory units. For instance, an oxygen plant must consist not only of the double column for distillation but also of the compressors and heat exchangers without which the double column is useless. Similarly, the sulfuric acid plant is complete from sulfur to sulfuric acid on its way to the tank farm. The one modification of this definition was made in the case of the high-pressure hydrogenation stalls which include all the high-pressure process equipment but do not include the high-pressure compressors or paste-injection pumps.

Integral plants have been cited in the few instances where data were available for units built along parallel lines (GR-S rubber plants, styrene plants, and German Fischer-Tropsch units). These latter data, even under the most favorable conditions, do not strictly conform with the above criteria of comparability, however, and they have been included primarily to determine whether the cost-capacity function for conglomerate plants differed materially from that for the individual process units of which the plants are composed.

The present comparison has shied away from unproven estimates and has insisted on the use of cost data actually achieved or estimated by contractors well experienced in the construction of the particular type of plant quoted by them.

Cost data of the type needed for this comparison are very rare. Aside from published American information and private quotations received from contractors, recourse was had to German plant-erection costs which are available in somewhat richer harvest as a result of allied postwar investigations of German industry. The similarity in the cost-capacity function developed for oxygen plants of American as well as of German construction leads to the conclusion that such German data may be applied to American cost estimates with impunity.

Conclusions

It is seen from the accompanying curves that the plant cost can indeed be expressed with excellent precision as a direct exponential function of capacity. Of the 19 types of plants listed, the exponent x in Equation 3 varies between 0.58 and 0.82 in the case of 16 units (i.e., 84 per cent). The exceptions are the high-pressure stalls for which the exponent is only about 0.32, and the small oxygen plants which follow an exponent x = 0.47.

Neither of these exceptions is particularly surprising. Plants operating at very drastic conditions (notably of pressure) incur such high costs in erection and piping, regardless of size, that it is a matter of relatively small influence on the plant cost whether 3 or 6-in. piping is employed. The main cost difference is due to the equipment items proper and secondary cost factors do not hold step with variations in equipment cost under these circumstances. Moreover, high-pressure equipment prices are related to volume by an exponential factor less than 0.6.

As for the small oxygen plants, it is also not surprising that they should exhibit so small an exponent, for they are of the size generally referred to as "portable." It must be noted that very small equipment follows an exponent which is less than 0.6 and that engineering and instrumentation costs for such units assume a very much larger share of the total than is true of commercial-size plants. There is no doubt that very small sulfuric acid or soybean or water-gas plants would also follow a smaller exponent than is true of the corresponding larger process units.

The only cost-capacity function which deviates materially from a simple exponential relation is the plot for water-gas plants. The curvature in the plot is due to the fact

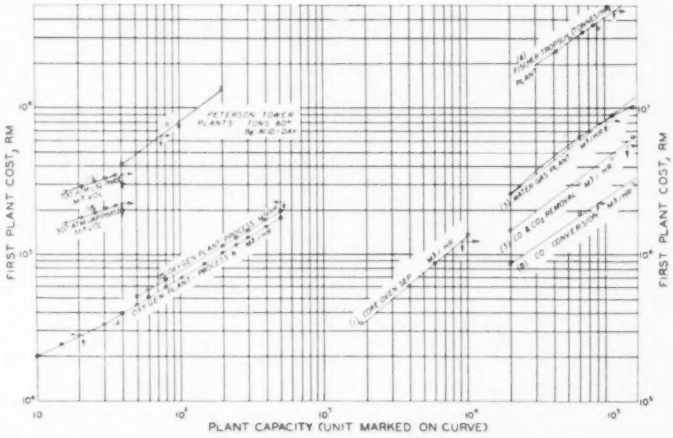
FIRST PLANT COST, RM
PLANT CAPACITY (UNIT MARKED ON CURVE)
FIRST PLANT COST, RM
PETERSON TOWER PLANTS
TONS SOY BEAN OIL/DAY
(1) WATER GAS PLANT
(5) CO & CO2 REMOVAL
(5) CO CONVERSION
COKE OVEN GAS

Fig. 2—Cost data plotted for Plants 1, 2, 4, 5, 6, 8, 14, 15, 17, 18 and 19. (Plant details given on pages 84 and 95.)

*Cost index data for American construction are taken from Engineering News-Record. Cost index data for German construction are taken from Reference 6.

that the data available for the water-gas plants were the least comparable of all the process units here considered since two or the larger plants contained a few Pintsch-Hillebrand gasifiers in addition to the standard water-gas machines which all of the plants had in common.

Three-Point Rule

To the extent that these plant cost data permit a generalization beyond the establishment of the validity of Equation 3, it is the following three-point rule:

1. In the equation: (Cost of plant of size A) = (Cost of plant of size B) $(A/B)^x$, the exponent x varies between 0.58 and 0.82. Unless the type of plant under consideration can be fairly compared to one of the process units listed below, a value of 0.7 may be employed for the exponent in the above equation.

2. A smaller exponent (0.3 to 0.5) applies to process units exposed to very drastic conditions, notably of pressure.

3. Very small process units should be evaluated by the use of an exponent varying between 0.4 and 0.55.

This rule applies apparently with equal force to integrated plants as to individual process units.

A corollary equation for the expression of initial plant cost per unit capacity takes the form:

$$(\text{Plant cost per unit capacity}) = (K') \times (\text{Plant capacity})^{(x-1)} \qquad (4)$$

where K' is a constant factor calculated as:

$$K' = \frac{(\text{Plant cost for capacity a})}{a^x}$$

and x is the exponent defined in the three-point rule stated above.

As an example, this equation can be applied to the sulfuric acid plant costs (contact process) included in the present study. It is found that the cost-capacity curve follows the function:

$$(\text{Initial plant cost/daily ton acid}) = 23{,}600\ (\text{Plant capacity})^{-0.4}$$

Actual quotations check this equation with a mean deviation of 2.6 per cent and a maximum error of 6 per cent.

Individual Cost Data

Following is a list of the exponent values applying to the process units included in the present study. Similarity of a process under study to one of the listed operations should permit the use of the corresponding exponent value.

Process unit—	Value of exponent x	Source of data	Base year
1. Coke-oven gas separation	0.82	5	1935
2. Water-gas plant	0.81	6	1935
3. Two-coil cracking	0.79	7	1937-3
4. Fischer-Tropsch plant (including gasification, gas purification, and product distillation)	0.77	8	1935
5. CO and CO_2 removal from hydrogen	0.74	6	1935
6. Petersen sulfuric acid towers	0.73	9	1931
7. Soybean extraction plant	0.70	10	1949
8. Water-gas shift conversion	0.69	6	1935
9 and 9a. Sulfuric acid (contact process)	0.65	11	1948
10. Styrene from ethylene and benzene	0.63	12	1943
11. Oxygen plant—process (a)	0.64	13	1948
12. Atmospheric petroleum topping	0.64	7	1938?
13. GR-S rubber	0.63	12	1943
14. Oxygen plant—process (b)	0.59	5	1935
15. Oxygen plant—process (c)	0.59	13	1948
16. Oxygen plant—process (d)	0.58	5	1935
17. Small oxygen plant—process (b)	0.47	5	1935
18. 300-atmosphere hydrogenation stall (vapor phase)	0.33	6	1935
19. 700-atmosphere hydrogenation stall (liquid phase)	0.31	6	1935

A word of explanation is in order regarding the various processes employed and the scope encompassed by the cost data.

1. Coke-oven gas separation.—This process involves the low-temperature separation of the components of coke-oven gas by means of the Linde-Bronn system. The process is carried out at 370 psig. and at temperatures ranging down to —220° F. The scope of the process unit covers from the intake of purified coke-oven gas at atmospheric pressure to the discharge of the separated gases, also at atmospheric pressure. Storage space is not included.

2. Water-gas plant.—The quotations are given for standard water-gas machines, system Demag, operating cyclically. Unfortunately, the data are not entirely consistent in that two of the larger plants also include a few continuous gasifiers of the Pintsch-Hillebrand type. Dust-removal system, waste-heat boiler, and accessories are included in the quotations.

3. Two-coil crude cracking.—This is a thermal cracking operation for the production of gasoline and fuel oil. The plant includes a fractionator for the separation of the two products from intermediate fractions which are recycled to the cracking furnace. A gasoline stabilizer column is included as are also all ancillary heat exchangers, flash tanks, pumps, etc.

4. Fischer-Tropsch plant. This is a complete integral Fischer-Tropsch synthesis plant based on German Ruhr coal. Synthesis gas is produced in standard water-gas machines (type Demag). Water-gas conversion units are provided for correction of the hydrogen-carbon monoxide ratio. Sulfur removal is carried out by alkaline (Alkazid) scrubbing followed by iron oxide and finally by hot alkalized iron oxide boxes. The catalytic converters are of German finned-tube design and cobalt catalyst is employed. Steam and power plants are provided but a catalyst factory is not included in the examples cited. There is some variation in the exact makeup of the plants, notably in that one of the plants has three (instead of the usual two) converter stages, and another has a small section operating at elevated pressures (300 psi.). The data have been accepted nevertheless, because these variations affect the total plant cost only to a minor extent.

5. CO_2 and CO removal from hydrogen.—Carbon dioxide is removed by absorption in water at 420 psi. Most of the water is regenerated by aeration in wooden-louver towers operated at atmospheric pressure. A Pelton wheel is provided for the recovery of the energy of expansion. Carbon monoxide is removed by scrubbing with aqueous copper ammonium carbonate solution at 4,800 psi. The sorbate is released at substantially atmospheric pressure. The cost of gas compressors is not included in the data presented.

6. Petersen sulfuric acid towers.—This is a plant for the production of sulfuric acid by a version of the chamber process. The sulfur dioxide-containing gases pass through five towers in succession: one denitrating tower, two production towers, and two Gay-Lussac towers. The circulating acid flows in exact countercurrent fashion. Price quotations are for the completely erected plant, exclusive of land and electrical dust precipitators.

7. Soybean plant.—This is an extraction process for the manufacture of soybean oil and ground meal. Process details have not been made available. Quotations include the entire process unit completely housed in, but without steam or power plant or storage facilities.

8. Water-gas shift conversion.—Carbon monoxide in water gas is converted to hydrogen and carbon dioxide by the action of steam in the presence of a catalyst. The reaction is carried out at atmospheric pressure. Plant cost includes catalytic converters and ancillary heat exchangers but does not cover CO_2-scrubbing system.

9 and 9a. Sulfuric acid (contact process).—This is a packaged unit for the catalytic production of sulfuric acid from sulfur as supplied by two major American engineering firms. Only equipment within the plant boundaries is included, notably the converter, blower, drying tower, and absorber systems. No acid storage, extensive sulfur storage, railway trackage, sewer, service lines outside plant boundaries, etc., are included. It should be noted that the quotations received from the two different sources (indicated by squares and circles, respectively) are almost identical.

10. Styrene from ethylene and benzene.—This is a plant consisting of several chemical process units. The source of ethylene is not always consistent—being partly derived from refinery gases, partly from thermal cracking of propane, and partly by the dehydration of ethyl alcohol. Catalytic alkylation for the production of ethylbenzene is followed by purification of this product and its catalytic dehydrogenation to form styrene which is then vacuum distilled. Quotations include steam and power plant and storage facilities. The process design for the various plants is not entirely consistent and the data are therefore in doubt.

11. Oxygen plant—process (a).—This is a plant for the production of 95-98 per cent oxygen from air using a modification of the Linde-Frankl process. This particular variant has been developed by Air Products, Inc. The process involves the separation of oxygen from nitrogen by distillation at low temperatures in a double column operated at two different pressures. Cyclically operated, metal-packed regenerative heat exchangers are provided. Compressors are included in the quotations.

12. Atmospheric petroleum topping.—This is essentially a rough separation of petroleum crude into reduced crude bottoms and light overhead, brought about by distillation. The overhead cuts include gasoline and gas taken off at the top of the distillation column, as well as naphtha, light gas oil, and heavy gas oil drawn off in three sidestreams. Heating is carried out in a pipe-coil heater which is usually gas fired. Ancillary heat exchangers, etc., are included in the system. While the number of stages is not specified in the source

(Continued on page 95)

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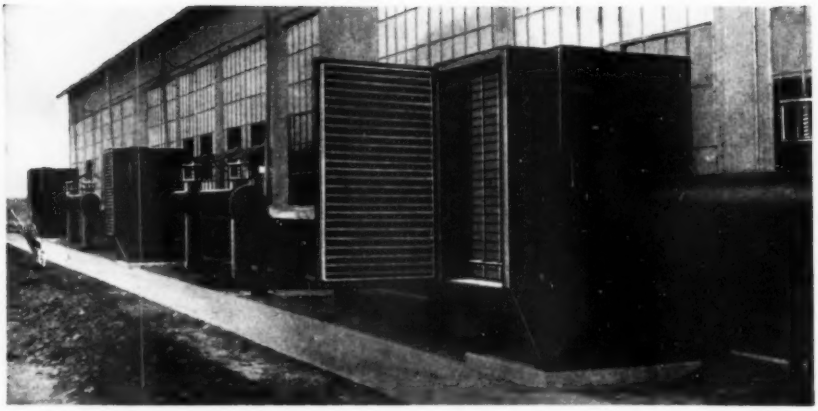

Fig. 1—Constant-effect-type filters serving gas-engine intakes in a gas-compressor station. These filters are fitted with louvers to prevent entrance of snow, water, birds, and insects which might impair filter operation.

PLANNING MODERN GAS-COMPRESSOR STATIONS

4. Cooling Equipment, Air Filters, Exhaust Systems

by Tyler G. Hicks*

THE cooling units with which gas-compressor-station operators are concerned are the circulating pumps and water-cooling tower, pond, or finned-tube cooler. These units must function at their rated capacity or else the station will be required to shut down. Since a forced shutdown causes a loss of valuable production time, disrupts continuity of pipe-line operation, and usually represents a reduction of station "income" in terms of gas pumped, every precaution possible to prevent outages must be taken during station design. Usually this means duplication of certain equipment along with higher construction costs. Justification of the additional expenses may be difficult during station design but a review of operating records after the station has been on the line 5 or 10 years quickly shows that they have paid off several times or more. Of course, there are stations which have operated for 20 years without a breakdown but they can never be classified as typical. Operating records for too many stations prove this to be true.

Circulating Pumps

Cooling-water circulating pumps, whether for open or closed systems, are essential equipment and should be installed in duplicate. Regardless of how the required pumping capacity is divided to suit partial and full-load operation, two of each capacity pump should be installed, otherwise forced outages are almost certain to occur at some time during the useful life of the station. In new stations, duplicate pumps of the same manufacturer should be installed. Maintenance and storage of spare parts are thereby simplified and initial cost will usually be somewhat lower. In cases where pumps from other, older stations are available, every effort should be made to see that the units are alike in all respects. Duplication is a simple matter requiring only a small amount of the designer's time and it often pays off in terms of operating economy.

Pump types.—Single-stage centrifugal pumps, single or double-suction types, are suitable for raw and jacket-water circulation. These should be bronze fitted unless handling extremely corrosive water; in this case, special materials should be used. Centrifugal units are better suited for gas-compressor-station water pumping than reciprocating pumps because a steady discharge is obtained. When large quantities of water are circulated, say 1,000 g.p.m. or more, it is often economically justifiable to install two half-capacity pumps instead of one large-capacity unit. The advantages of such an arrangement are most frequently apparent in stations where part load operation is common. For instance, in a station where the total time operated at half load is 4 months per year, three-quarter to full load, 3 months, and full load, 5 months, substantial savings will be made during periods of partial load. Thus, for 4 months, only one pump need be used for jacket-water circu-

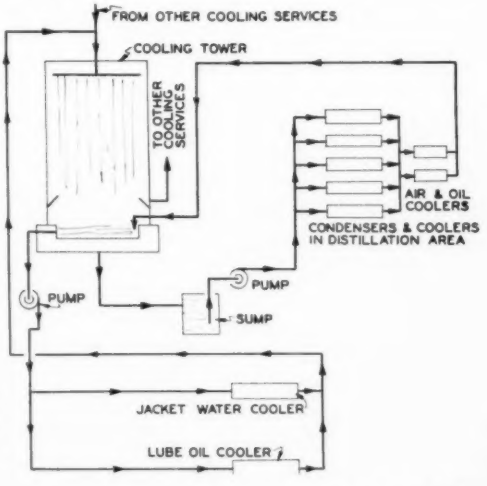

Fig. 2—General arrangement of cooling-water piping in a gas-compressor station serving a natural-gasoline manufacturing plant. All the water passes through two or more pieces of heat-transfer equipment before being cooled in the tower.

*Consulting engineer, New York City

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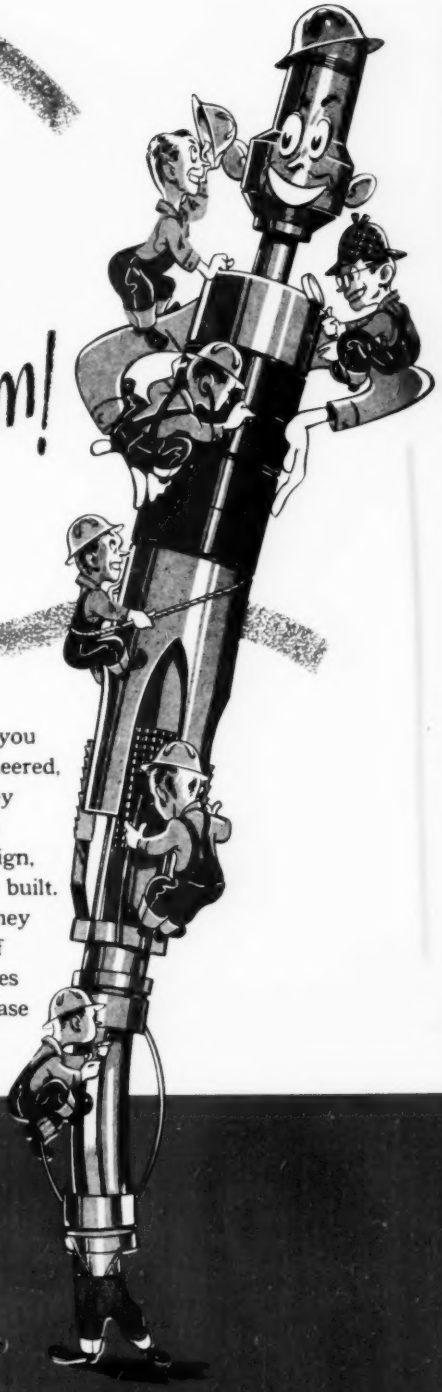

That's true of Lane-Wells packers, whether you check them, part by part, to see how they're engineered, or whether your knowledge is based only on how well they handle tough jobs. The micrometer-and-magnifier boys admire them for the oil country knowledge that shows in their design, for their top-grade materials, and for the way they're built. But most operators like them because they've learned they can depend on Lane-Wells packers to give leakproof packoff right where it's wanted, to withstand great differential pressures even under high temperatures (7,000 psi at 300° F.), and to release easily when pulled, without sticking, hanging up or swabbing. Any way you look at 'em, Lane-Wells packers are *good!*

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AP-303

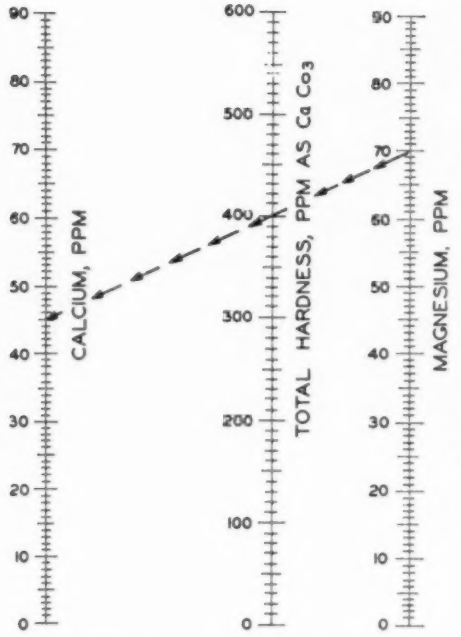

Fig. 3—(Left) Nomograph for determining total hardness of water, expressed as $CaCO_3$, when the calcium and magnesium contents are known. For example, with 70 and 45 p.p.m. of magnesium and calcium, respectively, total hardness is found by drawing the arrowed line as shown. At the intersection with the total hardness scale, read 400 p.p.m. total hardness.

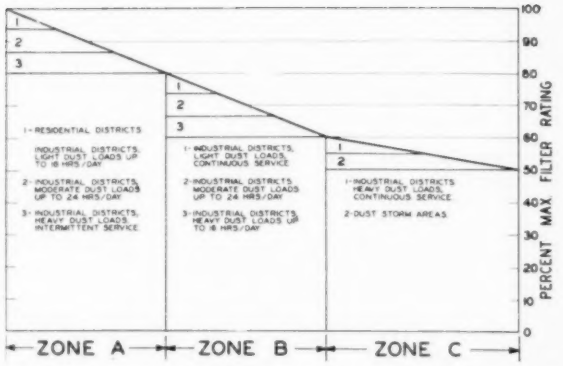
1-RESIDENTIAL DISTRICTS
INDUSTRIAL DISTRICTS, LIGHT DUST LOADS UP TO 16 HRS./DAY
2-INDUSTRIAL DISTRICTS, MODERATE DUST LOADS UP TO 24 HRS./DAY
3-INDUSTRIAL DISTRICTS, HEAVY DUST LOADS, INTERMITTENT SERVICE
1-INDUSTRIAL DISTRICTS, LIGHT DUST LOADS, CONTINUOUS SERVICE
2-INDUSTRIAL DISTRICTS, MODERATE DUST LOADS UP TO 24 HRS./DAY
3-INDUSTRIAL DISTRICTS, HEAVY DUST LOADS UP TO 16 HRS./DAY
1-INDUSTRIAL DISTRICTS, HEAVY DUST LOADS, CONTINUOUS SERVICE
2-DUST STORM AREAS
PERCENT MAX. FILTER RATING
ZONE A
ZONE B
ZONE C

Fig. 4—(Above) Capacity factors for dry-type intake air filters. Use of this chart is explained by the illustrative example given in the text.

lation. Since the pump will be operating at, or nearly at, full capacity, maximum efficiency will be obtained and power input will be a minimum. One large pump operating at half capacity would have a much lower efficiency and would require a greater power input. Of course, capacity need not be divided exactly as suggested here. Local conditions may dictate use of one pump with three-quarters of the required capacity and another with one-quarter capacity.

To determine which pumping arrangement is best suited for a given station, the probable annual load must first be predicted. If this prediction shows that partial load operation will be maintained for a period equivalent to several months, two-pump operation is worth investigating. Then the power costs for pump drive at various loads are computed using manufacturers' data on power input and efficiency at various loads for one large pump and two small ones. Comparison of these costs will show if two small pumps are justifiable and how long it will take for power savings to pay off the additional cost of the two-pump arrangement.

Pump location.—Raw-water pumps are now commonly located at the base of the cooling tower in a small structure to protect them from the weather. This location saves on piping and space. Since all circulating water pumps used today are motor driven, control from the main station house is simple. Jacket-water pumps should be located as close to the units served as possible because piping and power costs will be reduced. Centralized control of these units also reduces operators' leg work.

Cooling Apparatus

Cooling towers are a popular means for lowering both jacket and raw water temperatures. Occupying less ground area than cooling ponds, they are well suited for the usual gas-compressor station. All types have been used, atmospheric, mechanical draft, and finned-coil units. In small and medium-capacity stations where the amount of water to be cooled is not excessive, finned-tube units fitted with fans have been widely used in recent years. Large stations, however, are generally fitted with standard-type induced-draft towers. Regardless of tower type selected, every effort should be made to reduce the volume of water cooled because worth-while savings in tower and pumping costs result.

One means of reducing the volume cooled is shown in Fig. 2. Study of this sketch shows that most of the cooling water passes through two groups of apparatus in series, providing low-temperature cooling where required and moderate temperature cooling where close approaches to the wet bulb are unnecessary. Since most of the water does double duty, the volume circulated is cut almost in half. The piping arrangement shown is typical for a gas compressor station handling wet gas for natural-gasoline manufacture.

Since practically all cooling towers available today are of standardized design, preliminary selection is a simple problem, involving only use of manufacturers' rating tables or charts. The present practice in gas-compressor-station design is to select a cooling tower on the basis of rating tables and then send the results to the manufacturer for checking. While the results are being checked, the station design is continued on the basis of the preliminary tower selection. Experience shows that this method is usually satisfactory because any changes made by the manufacturer are generally minor and will not markedly affect over-all design of the station.

Water Treatment

Some form of water-treating equipment, such as the Zeolite process, lime-soda process, or dichromate treatment is used in nearly all large gas-compressor stations. In recent years, water-treating facilities have been fitted in smaller stations with excellent results. Once a site is chosen it is customary to have a complete analysis of nearby water supplies made so that the designer can select suitable treating equipment. Analyses are often reported in the ionic form and it is necessary to convert the results to total hardness in parts per million. Fig. 3 provides a convenient means for doing so.

Zeolite and lime soda.—Either of these processes may be used to remove compounds which might form scale in the engine and compressor jackets. These scale-forming materials are usually calcium and magnesium compounds and both processes are about equally effective in removing them from all common waters. Regardless of which type system is used, the jacket water should have an analysis close to that given in Table I after treatment.

Chromates.—Chromate-treated wa-

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Employing standard UNIBOLT connections rather than flanges, the UNIBOLT Manifold is many pounds lighter, yet the unique UNIBOLT design, which places more steel in shear, actually results in a higher factor of safety for the manifold.

Here are other reasons why more and more operators are specifying UNIBOLT Flow Manifolds for their Christmas trees: (1) Units of the manifold . . . Unibolt Adjustable Wing Valve, Unibolt Positive Choke Body, and Unibolt Tee or Cross . . . are pressure-tested as a unit and may be assembled in a number of combinations to best meet individual requirements; (2) Any desired volume of well flow may be accurately achieved with UNIBOLT Flow-Rated Beans, which are available in flow increments of 5% and 10%, or in standard fractionally drilled sizes; (3) Lower first cost and maintenance; (4) All parts may be safely and easily replaced in the field; (5) Its units are completely interchangeable; (6) The manifold is completely salvageable; (7) It is available in regular forged steel or in high-chrome alloy for corrosive wells — 6,000 lbs., 10,000 lbs., and 15,000 lbs. test.

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ter systems are also extensively used for gas-compressor stations. To date, the treatments used have been found to be simple to apply and highly effective in reducing engine and compressor jacket corrosion. Besides protecting the cylinder jackets, chromate-treated water will prevent corrosion in water-cooled pistons, oil coolers, and cooling towers. Treatments commonly used are completely discussed in the February 3, 1949, issue of The Oil and Gas Journal, page 85.

Air Filtration

Cylinder-liner wear results not only from corrosion. Abrasive particles drawn in with the intake air score cylinder walls, increase bearing wear, and reduce engine efficiency by forming a base for carbon deposits. Filtered intake air will increase operating time between reborings of cylinders from 5 to 10 times that obtained with unfiltered air. Since liner reboring is a job which costs thousands of dollars and requires complete shutdown of the unit for a week or more, air-filtering equipment quickly pays for itself. Experience shows that even in areas where only mild dust conditions are encountered, air filters are worth while because they protect both the liners and the engine lubricating oil.

Filter types. — Oil impingement, constant effect, and dry-type filters have all been successfully applied to gas-compressor stations. Filter maintenance time and costs are small when compared with reboring time and costs.

Dry filters usually employ felt as a filter medium. Viscous or oil impingement filters contain strands of oil-soaked galvanized wire which catch dust particles striking them. Constant-effect filters employ an intermittently rotated screen which is cleaned by passage through an oil bath at its lower end. The combined-type filter cleans the air and reduces intake noise which sometimes accompanies compressor operation. An oil bath, centrifugal action, and a bank of filter cells produce the cleaning and silencing action.

Filter selection. — Unless properly selected and applied, air filters will cause an excessive pressure drop between the outside air inlet and the engine manifold. Engine pumping losses will be increased with a resultant reduction in power output. If the engine is forced to operate at full load, high temperatures will develop in the cylinders, causing lubricating-oil carbonization and, possibly, piston seizure. Therefore, the need for correctly selected and liberally sized filters can readily be seen.

Constant-effect filter resistance averages about 0.4 to 0.5 in. of water, oil-impingement-type filters average about 0.25 in. of water, and dry types about 0.10 in. Constant-effect-type filters are suited for all gas-compressor-station applications and are avail-

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TABLE 1—RECOMMENDED WATER CHARACTERISTICS FOR ENGINE COOLING SYSTEMS

pH of water: 7.5 to 9.5	Oil content: None	Suspended solids: None
	Dissolved oxygen: None	

Hardness:

Organic matter: 0 to 5 p.p.m.	Ca and Mg sulfate: 0 to 15 p.p.m.
Chlorides: 0 to 6 p.p.m.	Ca and Mg carbonates: 0 to 70 p.p.m.

able in capacities up to about 100,000 cu. ft. per minute.

Oil-impingement-type filters should be removed periodically and the accumulated dust washed out. Then the filter elements are dipped in oil and returned to service.

Dry-type filters are cleaned with a vacuum nozzle, the felt filtering medium being good for 10 or more years' service. The chart in Fig. 4 is handy for determining the actual rating necessary for dry-type filters. Use is as follows:

Problem: A gas-compressor station located in an industrial district with moderate dust loads will operate continuously and requires 3,000 cu. ft. per minute of air for combustion. What is the required dry filter rating?

Solution: Inspection of Fig. 4 shows that this station comes under "Zone B," item 1. Referring to the upper section of the chart it is seen that item 1 ranges between 75 and 80 per cent of maximum filter capacity. This means that the filters, when operating at the maximum air requirements, should be handling only 75 to 80 per cent of their maximum rated capacity. Hence, using the lower value,

$$\text{Filter rating} = 3{,}000 \div 0.75 = 4{,}000 \text{ cu. ft. per minute}$$

The exhaust system of the engines in gas-compressor stations must perform two important functions: (1) discharge exhaust gases at an elevation where they will not be injurious to surrounding structures or persons, and (2) reduce exhaust noise. These functions must be performed without placing an excessive back pressure on the engine. Hence, during exhaust-system planning, line length, path, and pressure drop must be given careful consideration. Two-cycle engines are more susceptible to excessive exhaust-line length than are four-cycle engines. For first approximations during planning, it is usually assumed that 8 cu. ft. per second of exhaust gases will be handled per horsepower developed. When individual exhaust lines are used for each cylinder, a maximum length in feet of 5,000 divided by engine r.p.m. is often assumed to be satisfactory.

Fig. 5 indicates the effect of increased exhaust line length on diesel-engine-fuel rates, exhaust temperatures, and back pressures. As can be seen, the effects are most marked when the engine is not equipped with an exhaust silencer. Addition of a silencer makes the respective values almost constant and reduces exhaust noise to the point where it is not annoying.

Muffler or silencer volume should, in general, be six to eight times the piston displacement of the engine. When muffle pits are used, the volume should be about 20 times the piston displacement of the engine. Back pressures should be kept as low as possible because an increase of 1 psi. in back pressure decreases engine output about 2.5 per cent, approximately 1.5 per cent of this being caused by increased clearance gas pressure and the remainder by increased exhaust work.

Pipe Sizes

Fig. 6 provides a convenient means for quick determination of suitable exhaust pipe sizes. The engine manufacturer usually recommends the minimum size to be used but when this information is not available during station design, as is often the case, Fig. 6 can be used with complete safety. It is based on a moderate-length exhaust line without an excessive number of bends and loops. The sizes given will produce a back pressure of approximately 3 in. H_2O on the exhaust of the engine. The pipe size used should be at least equal to that given on the chart, never smaller.

Five rules which are good guides during exhaust line planning are: (1) keep the line as short as possible, (2) use the proper size pipe, either that recommended by the manufacturer or from Fig. 6, (3) use as few elbows and bends in the pipe as possible, (4) extend muffler tail pipe several feet above building roof and bevel it at an angle of 45° or greater, and (5) use an expansion joint between muffler and engine.

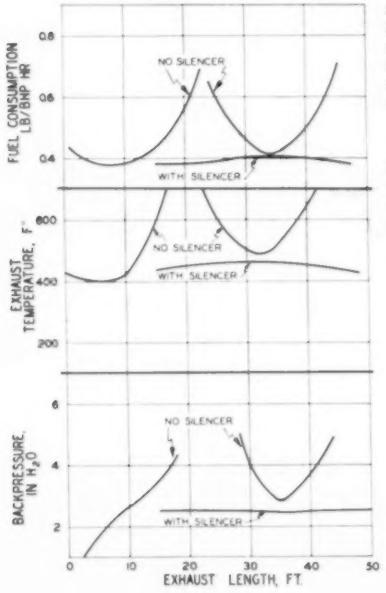
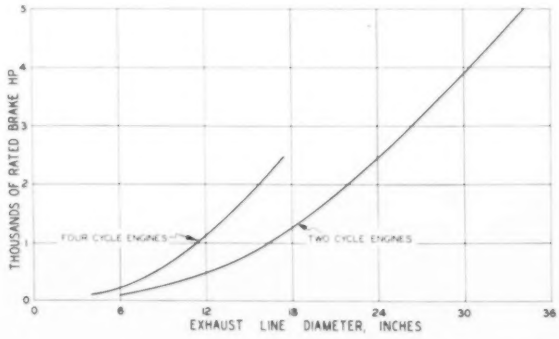


Fig. 5—(Left) Effects of increased exhaust-line length on diesel-engine fuel consumption, exhaust temperature, and back pressure. Note that all values remain nearly constant when a silencer is used.

Fig. 6—(Below) Recommended sizes for diesel-engine exhaust lines. These values should never be reduced without approval by the engine manufacturer.



BOOKS

SUMMARY OF SECONDARY-RECOVERY PRODUCTION STATISTICS AND ESTIMATED WATER-FLOOD RESERVES, KANSAS, 1948. Published by Interstate Oil Compact Commission, Box 3127, State Capitol, Oklahoma City.

This bulletin was a joint project between agencies of Kansas and the Interstate Oil Compact Commission. The information was compiled by Albert E. Sweeney, Jr., director of the Compact's Secondary-Recovery Division, and was reviewed and approved by the Secondary-Recovery Advisory Committee. The report contains a history of production from eastern Kansas counties as well as statistics on production from all Kansas counties. In addition, tables summarizing the secondary-recovery data on various Kansas counties are included. The production histories are presented graphically and nine maps of the producing areas are included.

BAASH-ROSS TOOL CO.

Baash-Ross News

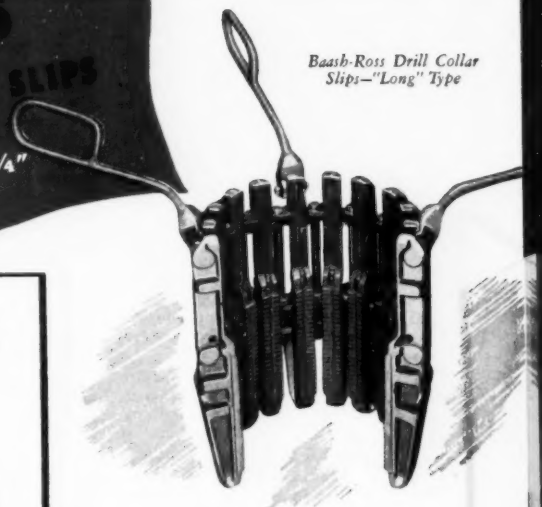
BAASH-ROSS TOOL COMPANY • LOS ANGELES • HOUSTON • OKLAHOMA CITY • NEW YORK

OUR 30th YEAR

4 HAZARDS

MAKE BAASH-ROSS DRILL COLLAR SLIPS "MUST" SAFETY PROTECTION

. . . And Every Drill Collar from 3" to 8¼" can have this vital protection!



Baash-Ross Drill Collar Slips—"Long" Type

FOUR HAZARDS make supporting a drill collar in the rotary table one of the riskiest of all rig operations . . .

. . . 1 *The constant change of drill collar diameter caused by wear and abrasion against the fresh-cut walls of the hole.*

. . . 2 *The usual flush design with no shoulders for stopping a slipping drill collar.*

. . . 3 *The drill collar's hard heat-treated surface that reduces gripping efficiency.*

and 4 *The relatively low drill string weight available for wedging the slips into the bowl.*

That's why safety-minded operators throughout the world have adopted Baash-Ross Drill Collar Slips as "must have" rig equipment, because these Slips are *specially designed* to overcome the risks of supporting a drill string in the rotary table. In contrast to the normal fixed-curvature design of rotary slips, the unique multi-segment design of Baash-Ross Drill Collar Slips permits them to w-r-a-p around the drill collar like a chain tong. They take a full slip-proof grip whether the drill collar is new or worn, round or out-of-round. *And they automatically compensate for as much as 1½" change in drill collar diameter — more than ample for modern drilling operations.*

For example, note in the table how a Baash-Ross Drill Collar Slip that fits a 7" diameter drill collar will also fit *any* diameter down to 5½". Adjustment for wear is automatic and continuous throughout the working range!

This means that Baash-Ross Drill Collar Slips automatically take a *full* grip on any drill collar within their range—a grip that gives adequate support to compensate for the continuous wear which changes drill collar diameters . . . for the hard heat-treated surface . . . and for the lack of drill string weight.

Sizes and Operating Ranges of Baash-Ross Drill Collar Slips

SIZE*	Operating Range	
	From	To
A	3"	4½"
B	3¾"	5¼"
C	4¼"	5¾"
D	5½"	7"
E	6¾"	8¼"

*(all sizes available in both "Regular" and "Long" types)

TWO TYPES

Baash-Ross Drill Collar Slips are available in two types —"Regular" and "Long." The "Long" type has extensions above the gripping area to provide a seat for the Baash-Ross Safety Clamp — the clamp that puts a non-slip, *yet removable*, "stop shoulder" on *any* drill collar to compensate for the hazards of flush design when supporting the collar in the table. For complete details see your nearest Baash-Ross representative — or write direct!

The "Why" of Baash-Ross Drill Collar Slips

ORDINARY SLIPS that fit the drill collar when new (A) are unable to adjust themselves to smaller diameters as the drill collar wears away. Result, grip becomes less and less adequate (B) and risk of a costly fishing job constantly greater.

BAASH-ROSS DRILL COLLAR SLIPS consist of many narrow slip segments flexibly linked together. Result —they w-r-a-p around the drill collar and always take the same *full* grip whether drill collar is new or worn, round or out-of-round.

LINERS ARE EASILY RENEWED

To insure long life, minimum maintenance and maximum gripping efficiency at all times, the liners in Baash-Ross Drill Collar Slips can be readily renewed by simply pulling a stainless steel pin, sliding out the worn liner, inserting a new liner and replacing the pin. *It's simple, quick and inexpensive!*

QUESTIONS on TECHNOLOGY

by W. L. Nelson
Consulting Engineer

Character of Crude Oils

What is the Kauri butanol number of the naphthas made from various crude oils? Maybe you can also outline the relation of U.O.P. characterization factor and other properties for us?—F. R. C.

The answer to the butanol number was given on the Questions of Technology page of February 9, 1950, but the general subject of crude oils is so complicated that the significant factors only will be discussed here, and in a later issue a tabulation of the specific relation between the factors will be presented.

The Bureau of Mines has been more active than any other organization in classifying crude oils. It has conducted numerous Hempel distillations of crude oils and in 1927, N. A. C. Smith in R.I. 2906 (Interpretation of Crude-Oil Analyses) designated the basis of crude oils in terms of key fractions No. 1 and No. 2 of Bureau of Mines Hempel distillations (see Table 1).

If key fraction No. 2 has a pour point above 5° F. the crude oil is designated as wax bearing. Crude oils intermediate in properties between paraffin base and naphthene base are called intermediate-base crude oils. The ranges of properties of crude oils are indicated in Table 2. It is obvious that the low-boiling fractions (key No. 1) can be of a different base from the high-boiling fractions (key No. 2) and hence a crude oil can be intermediate-paraffin base, paraffin-intermediate base, etc., indicating the base of the gasoline and kerosine fractions by the first name, and the base of the lubricating-oil fractions by the second name.

TABLE 1—BUREAU OF MINES KEY FRACTIONS

Key fraction	Boiling range (°F.)	Approx. avg. arithmetic atmospheric boiling point	Avg. boiling point from A.S.T.M. distillations†	Paraffin base: A.P.I. at 60° F.	Paraffin base: Approx. characterization factor	Naphthene base: A.P.I. at 60° F.	Naphthene base: Approx. characterization factor
1	482-527	504° F.	493° F.	over 40	over 12	under 33	under 11.5
2	527-572*	756° F.	715° F.	over 30	over 12.2	under 20	under 11.43

*At 40-mm. pressure. Corresponds to about 733° to 769° F. at atmospheric pressure.
†From A.S.T.M. distillations of Hempel fractions—H. M. Smith, Bur. of Mines, Tech. Paper 610.

TABLE 2—SIGNIFICANT PROPERTIES OF CRUDE OILS OR FRACTIONS OF THEM—APPROXIMATE RANGES

(See complete tabulation in a later issue)

Property—	Paraffin base (Pennsylvanian) (Green Mid-Cont.)	Intermediate base (Mixed) (Mid-Cont.)	Naphthene (Asphalt) (Coastal)* (California)*
Gravity, A.P.I. at 60° F.:			
235° F. boiling point	60-68	50-60	44-50
Key fract. No. 1	40-48	33-40	26-33
Key fract. No. 2	30-35	20-30	14-20
Characterization factor	12.1-12.5	11.45-12.1	11.0-11.45
Viscosity gravity constant†	0.802-0.828	0.828-0.882	0.882-0.928
Correlation index:			
Key fract. No. 1	up to 26	26-42	42 and higher
Key fract. No. 2	up to 33	33-60	60 and higher
Viscosity index†	92-111	40-92	40 and lower
Kauri butanol No.†	30-33	33-43	43-57
Smoke point:†			
430° F. boiling point	33 and higher	17-33	17 and lower
Aniline point, °C.:			
400° F. boiling point	68-80	50-68	38-50
500° F. boiling point	81-93	62-81	49-62
Diesel index:			
550° F. boiling point	68-80	44-68	27-44
Characterization gravity		23-32	under 23

*Not good usage because crude oils from these areas are not necessarily naphthene base. †Very approximate.

Gravity.—The relationship between gravity and boiling point is basic. It is employed in designating key fractions No. 1 and No. 2 of the Bureau of Mines, as well as other factors. A high gravity indicates paraffin-base properties whereas a low gravity (for a fixed boiling point) indicates naphthene-base properties.

Characterization factor.—This factor is in many respects more satisfactory than other relationships because it is the only factor by which a single number can represent the entire crude oil or any part of it, either the low or the high-boiling fractions. It is computed as:

$$K = \frac{\sqrt[3]{B.P.}}{s}$$

in which s is the specific gravity at 60° F., and B.P. is the molal average absolute boiling point in degrees Rankin (° F. plus 460). It was first presented by Watson and Nelson, Ind. Eng. Chem., 25, 880 (1933). It has been related to many design properties as well as the performance properties of products.

Viscosity gravity constant.—This involves the Universal Saybolt viscosity V at 100° F., as well as the specific gravity s:

$$V.G.C. = \frac{10\,s - 1.0752 \log (V - 38)}{10 - \log (V - 38)}$$

This, too, is nearly a constant for all fractions of a crude oil except that special modifications are necessary for very low-viscosity fractions such as gasoline or diesel fuels. Low values, 0.8-0.83 indicate paraffin-base properties (see Table 2). The V.G.C. has been used widely for characterizing lubricating oils [Hill and Coats, Ind. Eng. Chem., 20, 641 (1928)].

Correlation index.—This latest (1940) index of the Bureau of Mines (H. M. Smith Tech. Paper 610) is also based on boiling point k (°C. plus 273) and specific gravity s (at 60° F.):

$$C.I. = \frac{48{,}640}{k} + 473.7\,s - 456.8$$

Low values indicate paraffin-base properties (see Table 2).

Aniline point.—This has long been used as a measure of the aromatic hydrocarbon content of petroleum stocks. The values given here are primarily the result of the study presented on this page "Aniline Point and Other Properties," January 12, 1950, page 79, but in addition the aniline points of fractions from 24 crude oils were studied (McKinney and Blade, R.I. 4289, U.S.B.M., May 1948). It is also a function of boiling point and hence it is not a universally useful factor. A low value indicates aromatic or naphthenic hydrocarbons, and a good solvency power.

Kauri butanol number.—Aniline point along the K.B. number is used

widely to estimate the solvency power of naphthas. The relationship shown here is based entirely upon the Question of Technology page of February 9, 1950, (Kauri butanol number). Pure benzene has a K.B. number of 100 and hence the Kauri number in the upper ranges is most approximately equal to the percentage of aromatic (and unsaturated) hydrocarbons. Thus, a high value means that the naphtha is a good solvent for lacquers, resins, or nitrocellulose.

Smoke point.—Naphthenic and particularly aromatic hydrocarbons burn with a smoky flame and hence the percentage of such hydrocarbons in a kerosine should be low. Thus, a smoke point of 20 or lower is bad and a value of 30 or more is excellent. The relationship given here is based entirely on the data given in the October 14, 1948, issue of this page (Smoke Point Versus Other Properties). It is a standard test of the Institute of Petroleum (British) and is described in its "Standard Methods of Testing Petroleum Products."

Diesel index.—The paraffinic hydrocarbons have a good ignition quality and hence the paraffin and intermediate-base oils produce good diesel fuels. A high value of diesel index is desirable:

$$D.I. = GA/100$$

in which G is A.P.I. gravity and A is aniline point (°F.). The values shown here (and in the tabulation to follow) were computed from the aniline points of the Questions on Technology of January 12, 1950, from Table 15 and Fig. 34 of Petroleum Refinery Engineering (third edition) and from page 504 of Gruse and Stevens, Chemical Technology of Petroleum.

Characterization gravity.—Mithoff, MacPherson and Sipos, *(The Oil and Gas Journal, November 6, 1941, page 81)* have used the characterization factor to determine the quality of cracked gasoline. It is the average A.P.I. gravity of the fractions that boil at 350°, 450°, and 550° F., at a pressure of 25 mm. The octane numbers of cracked gasolines will be indicated in the tabulation that will be published later.

Panhandle Bid to Sell to Glass Works Being Heard

A hearing was started before Federal Power Commission on March 1 in Washington, D. C., under the shortened procedure for noncontested hearings, on application of Panhandle Eastern Pipe Line Co. for authorization to deliver natural gas for use at the Corning Glass Works' proposed new plant, to be constructed at Albion, Mich.

Panhandle is proposing to construct a meter and measuring equipment near Albion, and to connect its facilities with a proposed new 8-in. line to be constructed by Corning.

Effect of Plant Process Size on Capital Cost

(Continued from page 84)

for these cost data, the low quotations lead to the assumption that a single-stage distillation process is implied.

13. GR-S rubber.—This is a polymerization plant for the production of GR-S rubber from butadiene and styrene. The product is shipped to rubber-fabricating plants. Steam facilities are not provided. Not all of the units quoted are designed on an absolutely comparable basis and the data presented for this type of plant are therefore somewhat in doubt.

14. Oxygen plant—process (b).—This is a unit for the production of high-purity oxygen from air, constructed by Linde G.m.b.H., Germany. The process involves the low-temperature separation of air in a double column. A version of the classical Linde process is employed, involving compression of the entire air feed, and eliminating outside sources of refrigeration.

15. Oxygen plant—process (c).—This is similar to Item 11. The cycle differs somewhat, however, and this particular process version is due to Elliott Co., Inc.

16. Oxygen plant—process (d).—This is similar to Item 14. Outside refrigeration is here provided by mechanical means. Maximum air pressure is 60 atmospheres.

17. Small oxygen plant—process (b).—This is identical to Item 11 except that the plants covered in this category are small enough to be below the break point on the capacity-vs.-cost chart.

18. 300-atmosphere hydrogenation stall (vapor phase).—This process unit is intended for the high-pressure hydrogenation of a middle oil (180°-325° C.) fraction for the production of gasoline. For any given raw material, the capacity is roughly proportional to the converter volumes plotted. The quotations apply to a stall consisting of a concrete chamber, a preheater, two interchangers, a cooler, a control room, a cold catchpot, and a number of converters.

19. 700-atmosphere hydrogenation stall (liquid phase).—This process unit is intended for the production of middle oil from carbonaceous matter of high molecular weight by hydrogenation at high pressures. In plants erected to date, 700-atmosphere liquid-phase operation has been essentially restricted to the conversion of high-rank bituminous coal and of pitch. In addition to the ancillary units listed for Item 18, the liquid-phase stall also includes such extras as hot catchpots, hot letdown systems, etc.

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Acidization in the Permian Basin

(Continued from page 79)

particles up to ⅛ in. in diameter rather than the usual mud or the jelly seal.

Another company recommended the following procedure: Mix, in excess of the calculated amount needed for fillup, a very heavy mud; hang the tubing just off bottom and pump all the mud down and out of the tubing. Then raise the tubing to a point off bottom where the top of the blanket is desired, and wash out by circulation any excess mud. Too many operators expect the fluid to go to bottom when the tubing may be several feet off bottom and thus they receive absolutely no seal.

Even when one of these methods is used, a positive sealing effect against the passage of the acid cannot be guaranteed. Probably the most exact methods are the use of cement or plastic plugs. The other methods of sealing off zones have been discussed previously under "selective treatments."

Acidizing Limestone and Dolomite Formations Containing Silicates

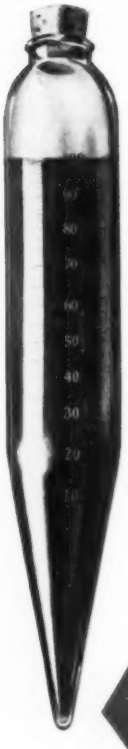
An investigation of some formations in this area which are 80 per cent or more soluble was started by one of the acid companies. Treatment of these zones has been ineffective and in some cases a plugging of the natural permeability was noticed. It was found that these formations contained silicates. The silicate materials are insoluble and are capable of swelling tremendously in the presence of spent acid. Consequently, they were forming a heavy sludge which had to be carried by the acid and were thus making it difficult for the acid to penetrate the formation.

A new material has been developed in the laboratory, which is claimed will counteract the tendency of the silicates to swell by lowering the pH of the spent acid. Most silicate minerals swell much more in spent acid with a pH above 5 than they do in a strong acid or a solution which has a pH of around 3. By adding this new material in the form of a powder, the acid is prevented from spending to a pH of 5 and held to a pH around 3.[2]

Acknowledgments

1. The Western Co.
2. Dowell Incorporated.

The author gratefully acknowledges the reviewing of this paper by W. N. Little, J. E. Roth, and E. B. Miller, Jr., of Tide Water Associated Oil Co.



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T 50-2

Specification of Pipe

FOR REFINERY SERVICE

by O. L. Lewis*

IN refinery and gasoline-plant design there are many pipe and tube material specifications, each of which may be used to advantage in its particular application, especially when over-all economy is considered. Both A.S.T.M. and A.P.I. have developed specifications covering these materials and most plant designers depend upon them almost entirely.

The A.S.T.M. specifications are incorporated into Section 2 of the A.S.M.E. Boiler Construction Code and wherever this code is enforced the use of construction materials meeting these specifications is, of course, mandatory. This code applies primarily only within the block valves at a steam-generating plant. Outside of that portion of a refinery or gasoline plant, all other piping falls within the scope of the A.S.A. Pressure Piping Code and either A.S.T.M. or A.P.I. specifications may be used. The A.S.T.M. specifications are used normally inside plant or refinery boundaries, whereas A.P.I. specifications are used almost entirely for pipe-line work.

Two of the most commonly used specifications in refinery and gasoline-plant construction are: (1) A.S.T.M. A-106 carbon steel and (2) A.S.T.M. A-158 P5A, 4-6 chrome, ½ moly.

Chemical Composition of Steels

Before going into detail on these two specifications, it might be well to look at the effect of the various elements contained in the chemical composition of these steels and the physical properties expected of them.

Carbon. — The carbon content in Grade A carbon steel is limited to 0.25 per cent. In general, this type of material is used where a soft ductile material is preferred over that which might be hard or brittle, and where higher tensile strength at atmospheric temperature is not required.

As long as carbon content is held below 0.35 per cent no trouble is expected in welding, and heat treatment after welding is seldom necessary except in sections over ¾ in. thick. Sections of this thickness will not normally occur except in extremely high-pressure piping where stress relieving should be employed to provide a higher safety factor.

Manganese. — This element tends primarily to slightly increase tensile strength and yield point at moderate temperatures, and is normally held below 0.9 per cent.

Silicon.—When specified, silicon is held to a minimum of 0.10 per cent with 0.25 per cent maximum. The silicon-killed steels being of more uniform structure lend themselves better to bending, "Vanstoning," and other forming processes. Silicon-killed steels also exhibit higher creep strength, which again is reflected in the allowable stresses. In the boiler construction code 0.50 per cent higher stress is assigned at 1,000° F. to the carbon steel, with at least 0.10 per cent silicon content, than to a similar steel with lower or uncertain silicon content. Silicon also serves to increase resistance to oxidation at high temperatures and improves impact strength for low temperature services.

Aluminum.—This is sometimes used in place of silicon and is relatively susceptible to graphitization. Experiences, particularly in the power piping field, have led to recommendations that aluminum-killed carbon steels be limited to services below 750° F. This practice is not as common among refinery engineers since their experience has been more favorable.

Phosphorus, Sulfur. — Both phosphorus and sulfur are objectionable unless limited to very small amounts, usually a maximum of 0.04 per cent phosphorus and 0.06 per cent sulfur.

Molybdenum.—Element is primarily useful in promoting high-temperature or creep strength. Chromium acts as a graphitizing inhibitor and at the same time offers a direct measure of the resistance of an alloy to certain forms of corrosion, primarily those forms caused by sulfur compounds. Requirement for oxidation and corrosion-resisting high-temperature materials in the refining industry has led to the development of a number of chrome moly steels.

Nickel, chromium.—In amounts of 2.5 per cent or more, nickel adds toughness at low temperatures and therefore is often used as an alloying element in pipe materials intended for refinery refrigeration service. It is not desirable in steel for higher-temperature service except in large amounts to obtain an austenitic structure.

Austenitic chromium-nickel (stainless) steels, have maximum resistance to many forms of corrosion and excellent creep strength. They are usually considered suitable for temperatures from —320° F. to plus 1,500° F. and higher.

Titanium and columbium. — These two elements are stabilizing agents which tend to prevent carbide precipitation found in the 18 per cent chrome - 8 per cent nickel steel and comparable alloys in the temperature range from 850° to 1,200° F. With these points in mind the simplest steel which will fill the purpose is

Why Specifications?

It is the intention of this paper to point out that when the plant pipe foreman says: "Hey, Joe, bring me a piece of pipe," there are a great many unanswered questions in addition to "What size?" Some of these questions are never

asked and never answered in a great many plants, because no one involved understands why the code limitations are set as they are.

It is possible to specify any number of grades of pipe which will serve an application after a fashion. One of these grades will be most economical and should be used if at all possible, and by economical it is not only meant material cost or only material and labor, but also a consideration of those factors as well as time lost in waiting on delivery, over-all life of material, and characteristics necessary because of service requirements.

*Jones & Laughlin Supply Co., engineering and construction division, Tulsa.

normally specified in the interest of economy.

Common Specifications

Common specifications which are not covered here in detail but which have definite plant applications are:

1. A.S.T.M. A-120 is the lowest grade of pipe which can be specified. Neither chemical composition nor physical tests are specified for this steel. Pipe made of this material is only tested hydrostatically at point of manufacture. Due to the lack of specification control, use of this material is not allowable under the boiler construction code and it is limited to 450° F. at low stresses under A.S.A. Pressure Piping Code, Power Piping section. It is not acceptable for oil piping. It is used normally for low-pressure fuel-gas and water piping in either black or galvanized.

2. A.S.T.M. A-53 probably has the widest usage in gasoline-plant piping of any of this range of steels. Pipe manufactured of this material is allowable under both codes for service up to 750° F. temperature, although it is not specified by most designers for use at high pressures, regardless of allowable stress; the reason in both instances being that the only chemical composition control is on the phosphorus content with a maximum of 0.06 per cent specified. The material carries the same maximum tensile strength and yield point requirements as A-106. Other physical tests are comparable though not as strict in requirement. Bessemer steel is acceptable under this specification with a maximum phosphorus content of 0.110 per cent, which is more than double the allowable for A-106.

3. The A.P.I. 5-L specification is comparable to A.S.T.M. A-53 except that Bessemer steel is not acceptable. Manganese is limited to 0.9 per cent and physical tests are required only on tensile strength and elongation. In general the material is considered slightly better than A-53 but it is not as closely controlled as A-106.

4. A.S.T.M. A-206 is a seamless carbon moly alloy steel for piping service temperatures from 750° to 1,000° F. It is a closely controlled steel both from chemical composition and physical property standpoint, its main application being in the power industry where there is a reluctance to use carbon steel above 750° F. for the reasons previously mentioned.

In the petroleum industry it is normal to use A-106 carbon steel up to a maximum temperature limitation of 1,000° F. which is also temperature service limit placed on A-206. When a material is needed for higher-temperature service, in petroleum plants it is normal to go to A-158, Grade P-5, which has application up to 1,200° F. For temperatures above this point or for special conditions involving corrosion, erosion, or high-temperature stress, a 12 to 13 per cent chrome (semistainless) is sometimes used. When high creep strength in the range of 1,500° F. is required, 18-8 austenitic steel of the types 321 or 347 is used.

Allowable stresses for the various piping materials are arrived at with reference to the chemical and physical properties in the tests imposed, and in their manufacture. Seamless pipe obviously is rated higher than welded pipe of comparable material characteristics. Different design temperatures command different stresses because of the obvious influence of temperature on strength properties; i.e., the short-time tensile strength and yield point, and the long-time creep strength.

The different service for which the pipe is used also affects the allowable design stress. For instance, A.S.T.M. A-106, Grade A, used in oil piping outside plant limits, would carry an allowable stress of 25,500 psi. at atmospheric temperature. Oil piping within plant limits at atmospheric temperature, would have an allowable stress of 18,000 p.s.i. and for 450° F. 14,150 psi. Power and district heating piping at atmospheric temperature would have an allowable working stress of 12,000 psi., and at 450° F., 10,560 psi. For power pip-

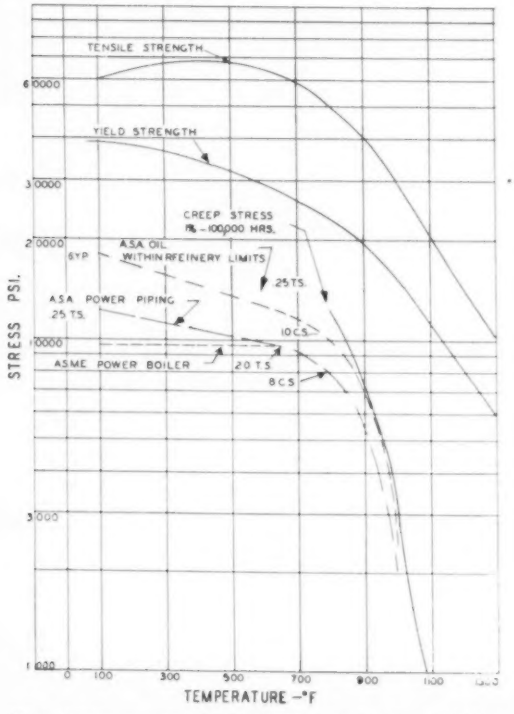


Fig. 1—Design properties, A.S.T.M. A-106 Grade A, carbon steel pipe.

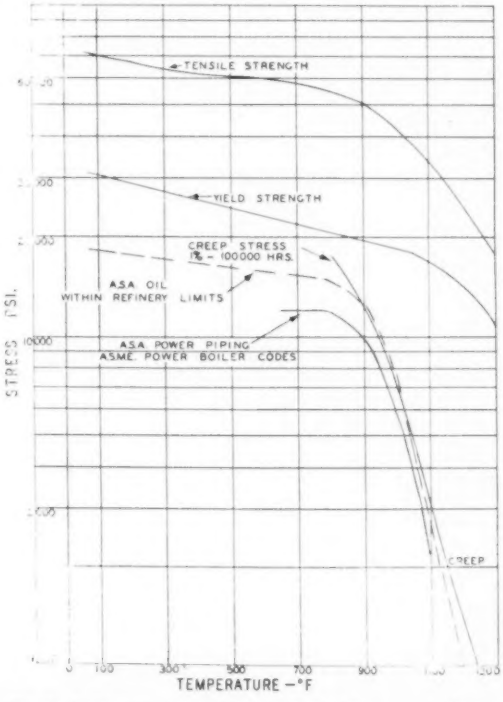


Fig. 2—Design properties, A.S.T.M. A-158, 4-6 per cent chrome, ½ per cent moly, pipe.

ing within boiler code jurisdiction at atmospheric temperature up to 450° F., 9,600 psi. working stress is allowable. The differences in these allowable stresses are due to historical background.

The setting of working stresses in the individual industries was due to evolution of design practices and was based upon design assumptions. The power industry, always being deeply aware of its responsibilities for uninterrupted services, has been quite conservative; therefore, the stresses allowed for power piping are the lowest of any in the codes. They have proven amply safe.

The oil refinery, natural-gasoline, and petrochemical process industries have used higher stress values throughout their development and these have been justified by an excellent safety record. These stresses still being below those used in cross-country transmission lines where the margin of safety is further scaled down. These cross-country lines usually operate at predetermined temperatures without variation.

The chart, Fig. 1, for A-106 carbon steel is plotted from test results of United States Steel Corp., which in most instances show actual properties in excess of code requirements. For instance, A.S.T.M. requires a minimum tensile of 48,000 psi. at 100° F. and yield of 30,000 psi. at 100° F. The steel tested in this instance shows 60,000 psi. tensile and approximately 33,000 psi. yield, both of these figures being above the minimum requirements for the next higher grade of steel.

Chemical specification on the steel (Fig. 1) are:

Carbon 0.08-0.20 per cent; manganese 0.30-0.80 per cent; phosphorus 0.045 per cent max.; sulfur 0.06 per cent max.; silicon 0.10 per cent min., 0.25 per cent max.

Refinery Applications

This steel is used in refinery applications up to about 950° F. It can be hot formed swaged, bent, or Vanstoned without danger of air hardening. A-106 material is normally annealed after these operations but annealing is not essential except where thick sections are involved. Working is normally done at about 1,650° F. Stress relieving, if required, can be carried out at 1,200° to 1,300° F.

This chart also shows basis for establishing allowable stresses under the A.S.M.E. Power Boiler Code and the various sections of the A.S.A. code. The boiler code stresses are based on 0.2 of tensile strength or 0.8 of creep strength, the lower value of the two being used.

A.S.A. Code, Power Piping Section, bases allowable stress on 0.25 of tensile strength up to 150° F., 0.2 of tensile from 150° to 650° and 0.8 of creep above 650° F.

A.S.A. Oil Piping Section, within refinery limits establish allowable stresses 25 per cent higher than corresponding power piping stresses. Those stresses are based on 0.6 of yield point up to 650° F. where allowable equals 0.25 of tensile. Above 650° F. allowable stress equals creep stress, producing 1 per cent creep in 100,000 hours.

The second chart (Fig. 2) covering 4-6 per cent chrome, ½ per cent moly steels, is made up from test information furnished by Climax-Molybdenum Co. and Babcock & Wilcox Tube Co.

Molybdenum as previously noted has a very favorable effect on creep strength at high temperatures. Plain moly or chrome-moly steels in the intermediate range have wide application, where a reasonably priced material with good creep strength at moderately high temperatures is desired.

Plain high-chromium steels including the low-carbon and medium-carbon grades, are important because of their resistance to corrosion and oxidation. The austenitic steels of 18-8 range are in a class by themselves with much higher creep strength than those of any other ferrous alloy.

The 4-6 per cent chrome, ½ per cent moly steels are standard in the petroleum industry for service up to 1,200° F. involving severe corrosive or oxidizing conditions. The steels containing less chromium are usually inadequate for severe corrosive oroxidizing conditions such as found in processing sour crude oil containing large amounts of sulfur or in superheaters where furnace atmosphere may be corrosive or oxidizing. The steels containing more chromium often do not show a sufficient increase in service life to justify the additional cost.

The 4-6 per cent chrome, ½ per cent moly steel is well suited for hot-forming operations and although air hardening, it responds readily to annealing. It may be annealed at 1,350°-1,400° F., followed by air cooling. To obtain grain refinement and low hardness, a treatment of 1,600° F. with slow cooling, not over 50° F. per hour, to 1,100° F. is required.

Welding should be done with approximately 500° F. of preheat. As the weld and heat-affected areas will be hard and brittle, heat treating as soon as possible after welding is desirable.

This material may be welded with a type 310 stainless rod (25 per cent Cr.-20 per cent Ni.) when a nonhardening weld deposit is required. The base metal in the weld zone will still be hardened and annealing or stress relieving is still desirable. Although this nonhardening rod is easier to work with and gives a more ductible bead, service conditions should be carefully considered because at higher temperatures, differences in coefficient of expansion may cause buckling or warping.

Summary

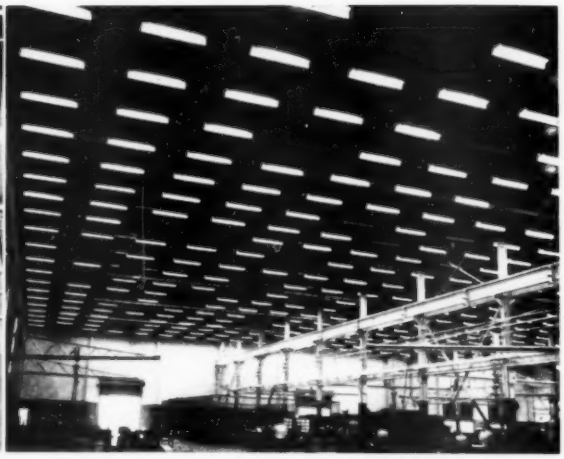
If a low-pressure gas or water is to be carried, an A.S.T.M. A-120 carbon steel with no chemical specification and no physical test requirements will prove satisfactory, as a rule. If the pressure or temperature is increased to where safety becomes a consideration, or if the line is in a critical location where its failure would close down an expensive plant, then a more closely controlled A-53 or A.P.I. 5-L is definitely warranted.

An A-106, Grade A Specification with carefully specified chemical composition and complete physical testing requirement should be used where temperatures exceed 750° F. or where it is desirable to be more certain of material quality. The so-called impurities, sulfur and phosphorus, are lower in the steel. It is silicon killed and will have increased corrosion resistance, increased resistance to scale (oxidation), and increased hardness and yield strength over the A-53 steel.

If a steel of additional strength is required for low to medium-temperatures use, the A-106 Grade B with increased carbon content and a minimum tensile of 60,000 and yield of 35,000, compared to 48,000 tensile and 30,000 yield on Grade A, would warrant consideration. Grade C with over a 0.35 carbon content is seldom used because of welding difficulties and brittleness unless heat treated.

Where a corrosive atmosphere is expected or high creep strength required for 900° to 1,200° operation, one of the chrome-moly steels should be used. In some applications, the carbon moly grade containing only 0.5 per cent moly will be satisfactory, as it shows a marked increase in high-temperature strength over the carbon steels. If service conditions are more severe, some intermediate chrome alloy should be used. As has been pointed out, the 4-6 per cent chrome, 0.5 per cent moly steels are by far the most popular for general temperature and medium corrosive application. They are relatively cheap and are easier to fabricate. The creep strength, corrosion resistance, and oxidation resistance of this steel make it desirable for a wide range of uses in service up to 1,200° F.

For application above 1,200° F. or for corrosion-resisting service, it may be necessary to go to a steel of the 18 chrome-8 nickel range, type 304 or similar. This steel has excellent resistance to corrosion and oxidation, possesses high creep strength, and may be used at temperature up to 1,500° F. If intergranular corrosion is a problem, type 321 to which titanium has been added, would be considered. If even higher temperatures are involved, the type 347 containing columbium would show greatly increased creep and tensile properties at high temperatures and still be resistant to intergranular corrosion.



Left: This view, taken from an overhead crane, shows the interior of Esso Standard's new central mechanical building, and the wide range of useful shop equipment. Right: View of the ceiling showing some of the many (more than 2,500) fluorescent tubes which provide illumination more than adequate for even the closest work.

ESSO'S NEW MECHANICAL BUILDING ROUNDS OUT EXPANSION PROGRAM

ESSO STANDARD OIL CO., Baton Rouge refinery, now has in operation its new $3,000,000 central mechanical building. The new shop covers an area of 3¼ acres. Housed in the building are the necessary machines, tools, and facilities required to maintain the expanded refinery operating equipment at this plant.

The photos on this page show the layout of the central mechanical building and give an idea of the equipment installed and the variety of job work that can be handled.

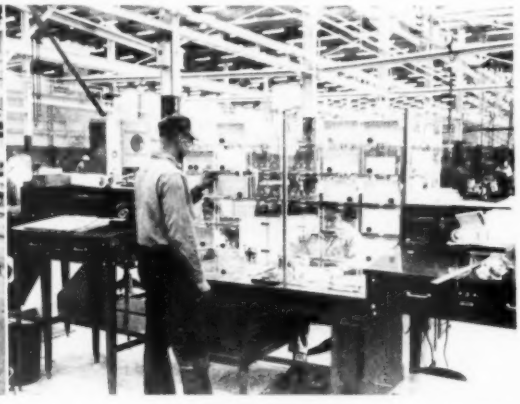
Good working conditions have been built into the big shop. The interior is finished throughout in acoustic tile to control the noise level of mechanical work. Air-conditioning equipment will provide 300,000 cu. ft. per minute. Illumination shown by light-meter tests to be excellent for the finest close work, is furnished by more than 2,500 fluorescent tubes. Exterior construction is of brick and Transite.

Three 15-ton-capacity cranes, as well as electric hoists at every machine, provide safe, automatic lifting power. Large electric refrigerators and warming ovens and an attractive dining area have been included for the lunching comforts of the employees.

Idea of the central mechanics building is to have refinery mechanics work under optimum conditions of comfort. The tools and machines are of the latest design for efficiency, safety, and facility of operation. Proximity of their working areas, as compared to the former conditions of scattered shops, and the complete mechanization of hauling and lifting, have expedited job handling by eliminating "lugging and tugging" almost completely.

Rounding out the expansion program, there remains under construction at the Baton Rouge refinery the six-floor main office building and two-story cafeteria, which the company officials estimate will be ready for occupancy during the early part of June. Cost of these two buildings, officials report, is in excess of $3,500,000.

Left: A crane-eye view of the tool cribs. Right: Job orders are obtained by all mechanics at new improved plastic work-order boards. H. P. Carpenter is getting job assignment here; L. A. Arceneaux, time keeper, is at the desk.



Diesel-Electric Barge

(Continued from page 70)

the jet bits may be applicable. The pumps can supply 1,000 hp. down to drilling depths of 10,000 ft.

The mud-pump hookup on Rig 44 is a little unusual in that the 650-hp. electric motors driving the pumps are direct connected. This direct drive is designed to reduce the wear on the gear end of the pump. Also, the elimination of belts and chains reduces maintenance difficulties and shutdown time. The three pumps (two 600-hp. at 60 r.p.m. and one 325-hp. at 65 r.p.m.) are hooked up so that the motors driving the two large pumps can drive a big pump and the standby, or either pump separately. The suction lines on the pumps are hooked up so that mud can be taken out of either end of any of the three active mud tanks (286-bbl. capacity each). Two standpipes have been installed on the rig.

Major equipment items on Rig 44 are as follows:

Emsco Derrick & Equipment Co. ECC 54 draw works, four-speed, 9 by 54-in. brakes, 10-in. shaft, 1,500 hp. max., 92,750 lb. max. line pull.

Dynamatic Corp. brake, Model 6032.

Emsco 18P, 136-ft. portable mast.

Drilling engines: Three General Motors Corp. Cleveland diesels, Model 8-278, rated at 715 hp. at 720 r.p.m. directly connected to Westinghouse 500-kw. generators, 230 volts d.c., 2,280 amp.

Draw-works motor: Westinghouse Electric Corp. 1,300-hp. intermittent service at 320 r.p.m., 5,000 amp. max. allowable current load.

Emsco 6 sheave crown block.

Emsco M-50 traveling block, 5 sheave, 50-in. diameter, 325-ton capacity.

Emsco 20½-in. rotary table, 250 tons capacity (still), 400 r.p.m. max.

Emsco Type H swivel, rated at 16,670 ft. with 4½-in. drill pipe.

Rotary motor—Westinghouse, 300 hp. at 550 r.p.m., 1,000 amp. max. working load.

Mud pumps: Two Oil Well Supply Co. 220-P, 600 hp. at 60 r.p.m., and one Oil Well 14P-HD, 325 hp. at 65 r.p.m.

Mud pump motors—Westinghouse, 650 hp. at 320 r.p.m., continuous duty, 2,030 amp.

Mission Manufacturing Co. air slips.

Blowout-prevention equipment: Hydril Co. 10-in., 5,000 psi. working pressure; 10-in. Cameron Iron Works, Inc., QRC, 5,000 psi. working pressure, with blind rams; 10-in. Cameron QRC, 5,000 psi. working pressure, with 5-in. rams.

With the eight lines which Penrod now has rigged up, the draw works can develop the following single line pull and hook load at various pulling speeds. (Penrod can rig up 10 lines, if necessary, which would increase the hook loads by one-fourth.)

	Pounds	
	Line pull	Hook load
High-high	17,500	140,000
Low (jackshaft)-high (drum)	32,625	261,000
High (jackshaft)-low (drum)	41,250	350,000
Low-low	81,250	650,000

Considerable conversion work was necessary to transform the war-surplus LST into a submersible drilling barge. It was necessary to remove as much of the curved bottom section as practicable so the barge could rest on bottom. This was done by cutting off both ends thus reducing the over-all length from 326 to 212 ft. The main deck was lowered and made parallel with the keel. In the bow, the LST equipment was removed and a drilling slot cut. This slot is 70 ft. long, 10 ft. wide, and 20 ft. deep.

The original crew quarters were left essentially the same. However, the port holes were replaced with large windows to insure better ventilation. Accommodations for 28 men are furnished. In addition, there is a guest room and a recreation room. A 42 by 32-ft. drilling platform was built in the bow. On the starboard aft corner of the platform is a 5-ton electric derrick for general usage.

For submerging the barge, there are 14 ballast tanks which can be separately or simultaneously filled or emptied. Three ballast pumps with a capacity of 1,500 g.p.m. are used for the emptying operation. Three fresh water tanks, with a capacity of 74,000 gal., are built into the hull. They are fitted with a remote automatic sounding system. Six diesel oil tanks, with a combined capacity of 118,000 gal., are also built into the hull. Three tanks for storing drilling water, when rig is operating in salt water, have capacity for 330,000 gal.

Gas Flow in Pipe Lines

(Continued from page 72)

In order to calculate Z_m the value of the mean pressure is calculated as follows:

$$P_m = (2/3)\frac{P_1^3 - P_2^3}{P_1^2 - P_2^2} = 703.1 \text{ psia.}$$

1. At this mean pressure, Z_m resulting from Fig. 1 equals 1/1.1135 or 0.8981.

By substituting this value of Z_m in Equation 7, Q is calculated to be 429,520,000 standard cubic feet per day.

2. Z_m can also be evaluated using the generalized compressibility factor chart. The reduced pressure at the mean pressure equals 703.1/674.0 = 1.043, and from the generalized compressibility factor chart, Z_m = 0.857.

Substituting this value of Z_m in Equation 7, Q is calculated to be 426,370,000 standard cubic feet per day.

D. Method used by Clinedinst:[3]

Clinedinst solves the integral in Equation 1 as follows:

$$\int_{P_2}^{P_1}\frac{P}{Z}\,dP = P_r^2\int_{P_{r2}}^{P_{r1}}\frac{P_r}{Z}\,dP_r = P_r^2\left[\int_0^{P_{r1}}\frac{P_r}{Z}\,dP_r - \int_0^{P_{r2}}\frac{P_r}{Z}\,dP_r\right]$$

From his generalized charts for natural gas, this integral is solved as follows:

$$P_r^2\int_{P_{r2}}^{P_{r1}}\frac{P_r}{Z}\,dP_r = (674.0)^2\,(0.818 - 0.372) = 202,630$$

By substituting this value in Equation 1, Q is calculated to be 431,120,000 standard cubic feet per day.

E. Method used by Joffe:[5]

Joffe solves the integral in Equation 1 as follows:

$$\int_{P_2}^{P_1}\frac{P}{Z}\,dP = 0.5\,(F_1 P_1^2 - F_2 P_2^2)$$

Values for F_1 and F_2 are obtained from his generalized chart for natural gas, and this integral is solved as follows:

$$\int_{P_2}^{P_1}\frac{P}{Z}\,dP$$

$$= 0.5\,[\,(1.105)\,(825)^2 - (1.070)\,(565)^2\,]$$

$$= 205,300$$

By substituting this value in Equation 1, Q is calculated to be 433,820,000 standard cubic feet per day.

In this problem the maximum difference between the daily flow rate calculated by the method using values derived from a typical supercompressibility factor curve in Equation 4 and the rates calculated by the other methods is less than plus or minus 1 per cent. Also the former rate is practically the same as the rate calculated using the mean compressibility factor obtained from a typical supercompressibility factor curve to integrate Equation 1.

However, it must not be assumed that the flow rate can be calculated with an accuracy limited only by the accuracy of the effect due to deviation from the ideal gas laws. Although it is believed that the use of values derived from a typical supercompressibility factor curve in Equation 4 to calculate the effect due to deviation gives the most accurate results, the present-day inaccuracy in the coefficient of friction limits the accuracy of the calculated flow rate to not less than plus or minus 2 per cent.

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5. Joffe, J., Gas Flow in Long Pipe Lines. Chem. Eng. 56, 130-131 (1949) August.

Special technique assures quality of Kellogg "knock-down" vessels

ONE of the frequent causes of high cost in the field-construction of large refinery vessels does not really start in the field at all. Actually it occurs in the shop-fabrication of these "knocked-down" vessels.

Mis-alignment is the field man's bogey . . . mis-alignment, not only between segments of any one course of a vessel but also between the different courses themselves.

To preclude the possibility of saddling any constructor's field crews with the costly field correction of "misfits," Kellogg shops follow a special routine developed from both *shop and field* experience.

In effect Kellogg completely "builds" even the largest vessels right in the shop. Beyond matching individual segments to master templates, each successive course of every vessel is superimposed on the previously assembled course. "Knocked-down" vessels built in this manner for the field can't help but fit.

Such accuracy in fabrication has brought wide recognition of Kellogg quality in all types of vessels. It gives assurance of exact tray positioning and leveling and of close tolerances in nozzle positioning. It's another reason why Kellogg vessels—completely shop-built or shop built in "Knock-down" form—achieve high operating efficiencies and low maintenance records.

Illustrated: Alloy clad 25' diameter reactor being "knock-down" fabricated in Kellogg shops.

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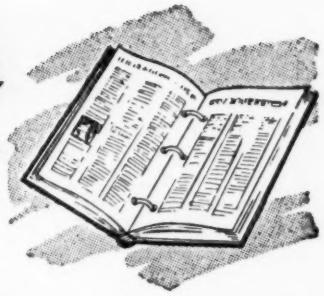
The Refiner's Notebook

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL



Modes of Control

ONCE a process has been analyzed in terms of process lag and capacity, the next step is to relate these to rate of load change. In the process of Fig. 1, load change might result from change in line steam pressure, for example. Regardless of the cause of load change, the over-all problem is that of adjusting the control valve in the steam line to the reboiler heater in such a way that tower temperature is maintained at a desired value in spite of load change. At this point it becomes important to consider the response or action of the controller with respect to changes in the controlled variable occurring as a result of change in load.

Available modes of control include:

1. **Two-position.**—This is also called on-off or open-shut. The control valve is always either completely shut or wide open depending on whether the value of the controlled variable is above or below the set point or value of the controlled variable which it is desired to maintain. The valve changes quickly from one extreme position to the other corresponding to a change in either direction in the controlled variable. Hunting or cycling is characteristic of this type of control.

2. **Proportional—or throttling.**—Air pressure to the control valve is regulated to produce positioning (opening or closing) of the control valve in direct proportion to the deviation of the controlled variable from the desired value. For the case of an instrument incorporating the recording function, as the pen deviates from the set point the control valve will move with it. Proportional band (or throttling range) for this type of control is expressed as the percentage of full controller scale range required to move the valve through its full travel. (The control valve moves with the pen at such a rate that the pen covers some given percentage of the chart range while the valve moves between the wide open and fully shut positions.)

Actually the valve will never be in either extreme position as in on-off control unless the deviation of the controlled variable from the set point is outside the proportional band. In proportional control the original set or control point may shift to a new control point under sustained load change. This shift is termed offset or droop. Narrow band proportional controllers are those with a 1 to 10 per cent proportional band while in a wide band instrument the percentage would be from 1 to 150 or more. Stated in another way, "wide throttling range requires large pen movement; narrow throttling range requires small pen movement."

3. **Floating** in which the control valve is moved very gradually to open or close between the extreme positions. Used with proportional action (proportional control with automatic reset) it produces different valve openings at the same controller set point. Offset due to change in load is eliminated. Where proportional control alone may have a manual reset to adjust the throttling band to either side of the control point this is done automatically when floating action is added. There is a continuous linear relation in proportional-plus-reset control between the rate of motion of the valve and the deviation from the set point of the controlled variable.

With the wide use of pneumatic transmission in refinery instrumentation it is possible to use interlocking or cascade control. One method of controlling tower temperature is indicated in Fig. 1. Such a system might be satisfactory under certain conditions. However, where a narrow-boiling-range process is under consideration, such as in an isobutane column with a relatively small spread of about 25 F. between top and bottom tower temperatures, the system of Fig. 1 would be subject to upsets and result in off-specification product. A better method would be the system of Fig. 2 in which the control point of the flow controller on the steam line to the reboiler heater is set by the temperature controller.

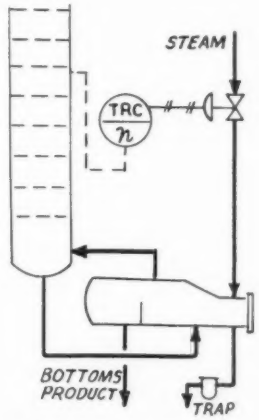


Fig. 1—Temperature control in a column where close control is not required.

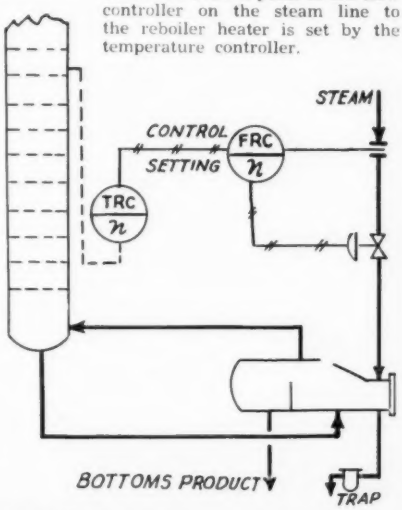


Fig. 2—(Right) Illustrating interlocking or cascade control as indicated by notation "control setting."

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The Big Inch and Little Big Inch are much longer. Other pipelines have more "inches" of diameter. But none has been tougher to build than the Columbia Gas System's "Toughest Inch". Rugged men and massive machinery are fighting the mountains and rocks and rivers of West Virginia to lay this giant steel tube from near Charleston, W. Va., to Rockville, Maryland.

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This year, The Columbia Gas System, Inc., Columbia Engineering Corporation and 18 operating subsidiaries will distribute more than 250 billion cubic feet of gas to customers in seven states and the District of Columbia.

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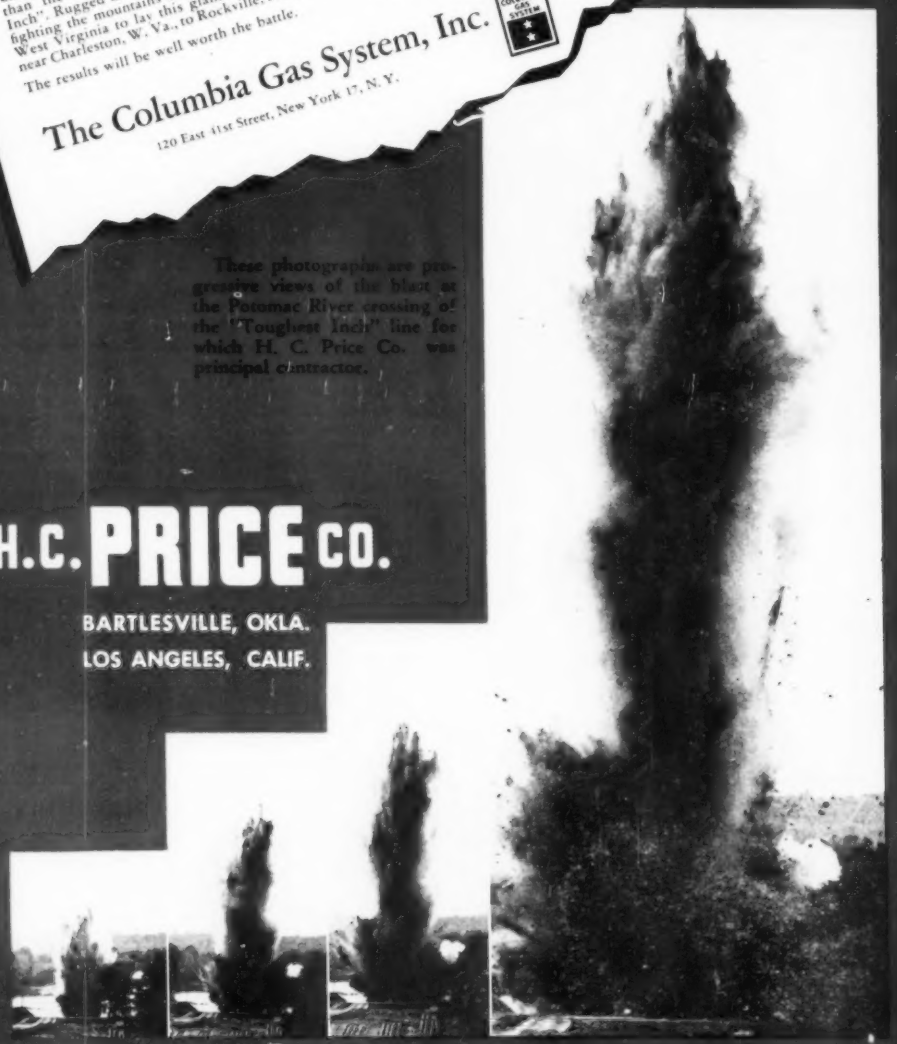
These photographs are progressive views of the blast at the Potomac River crossing of the "Toughest Inch" line for which H. C. Price Co. was principal contractor.



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Pipe-Line Construction

FOLLOWING is a tabulation of pipe-line projects, both domestic and foreign, which are planned or under construction. Included are crude-oil, products, and natural-gas lines. The list was compiled from surveys made by The Oil and Gas Journal.

Crude-Oil Pipe Lines—Domestic

Gulf Refining Co.—30 miles 8-10-in. lateral in Scurry County, Texas, under construction.

Humble Pipe Line Co.—371 miles, 18-in., under way, West Texas-Satsuma Station to Baytown, Tex.; 178-mile western section contracted to Morrison Construction Co.; 193-mile eastern section contracted by Anderson Brothers Corp.

Magnolia Petroleum Co.—60 miles 4-24-in. gathering system in La Ward and Lolita fields, Texas; Henry L. Lemons & Co., contractor; W. A. Remington in charge.

Mid-Valley Pipe Line Co. (Sun and Sohio)—1,000 miles, 20-22-in., under way, Longview, Tex., to Mayersville, Miss.-Covington, Ky., to Lima, Ohio. Contracts let for 857 miles as follows: Section 2, Haynesville, La., to Mayersville, Miss., Latex Construction Co.; spread office, Farmerville, La.; F. A. Silar, general superintendent; W. A. Briley, spread superintendent; office at Haynesville, La., W. H. Hayes, superintendent; M. L. Thompson, assistant superintendent. 41 miles, 12-in., lateral, Delhi to Lake Providence, La.; headquarters, Lake Providence; E. C. Norris, general superintendent; R. E. Thornton, superintendent. Section 3-A, Mayersville to Oakland, Miss., Associated Pipe Line Contractors, Inc.; J. A. Williams and L. H. Gray, spreadmen; Section 3-B, 4-A, Oakland, Miss., to Henderson, Tenn., Eastern Construction Co.; Section 4-B, 5-A, Henderson to Clarksville, Tenn., Eastern Construction Co.; Section 5-B, 6-A, Clarksville, Tenn., to Elizabethtown, Ky., field office, Clarksville, Tenn., Fred L. Byers, superintendent; Britton Construction Co.; Section 6-B, 111 miles of 22-in., Elizabethtown to Hebron, Ky., H. L. Gentry Construction Co., Frank Morris and Jim Mitchell, spreadmen; Section 7 South, Hebron, Ky., to Eaton, Ohio, Britton Construction Co., field office, Hamilton, Ohio; spreadman, Fred Peters; Section 7 North, Eaton to Lima, Ohio; Section 8, Magnolia, Ark., to Haynesville, La. Longview, Tex.-Haynesville, La., section, 110 miles 20-in., contracted to O. R. Burden Construction Co. Cumberland and Tennessee rivers, Eastern Construction Co.; field office, Clarksville, Tenn., Fred L. Byers, spreadman.

Naph-Sol Refining Co.—25 miles 6-in., under construction, Kimball Lake oil field, Newaygo County, Michigan, to refinery at Muskegon; Young Construction Co., Olney, Ill., contractor.

Phillips Petroleum Co.—45 miles 2-24-in., gathering system near Andrews, Tex.; Vaughn & Taylor Construction Co., contractor; Jess Moore in charge.

Pasotex Pipe Line Co.—32 miles 4-8-in., authorized, North Snyder, Tex., lines for gathering, delivery to Basin System.

Portland Pipe Line Co., Montreal Pipe Line Co., Ltd.—236 miles, 18-in., planned, Portland, Me., to Montreal, Que., Canada, contracted as follows: Oklahoma Contracting Co., 85 miles in Section 1 at southern end; Portland, Me., to Gorham, N. H. Associated Pipeline Contractors, Inc., Section 2, 81 miles; and Fred Mannix Co., Ltd., 68 miles, Section 3, in Canada.

Richfield Oil Corp.—40 miles, 10-in., Cuyama Valley-Newhall, Calif., planned; Bechtel Corp., contractor; central plant, Watson, Calif., 60 miles, 14-in., applying field joints, Newhall-Wilmington, Calif.; under way; Bechtel Corp., contractor.

Stanolind Pipe Line Co.—36 miles, in Kent County, Texas, outlet for Scurry County crude.

Texas-Empire Pipe Line Co.—42 miles, 16-in., authorized, Wilmington, Ill., to East Chicago, Ind.; O. E. Burden Construction Co., contractor.

Texas Pipe Line Co.—42 miles $12\frac{3}{4}$-in., Patoka, Ill., to Clay City, Ill.; L. R. Young Construction Co., contractor.

Products Pipe Lines—Domestic

Great Lakes Pipe Line Co.—261 miles, 12-in., under way; contracted as follows: 52 miles, 15-in., Albert Lea to Fairbault, Minn.; under construction; Sheehan Pipe Line Construction Co., contractor; field office, Albert Lea, Minn.; C. W. Henderson, spreadman. O. R. Burden Construction Co., 64 miles north from Des Moines; field office, Nevada, Iowa; G. D. Lewis, spreadman; A. C. Holder Construction Co., 72 miles to Iowa-Minnesota state line; Williams Brothers Corp., 20 miles, Mississippi River crossing and line to terminal and station. Kansas and Missouri river crossings, R. H. Fulton & Co.; field office, Kansas City; Ed Veach, spreadman.

290 miles, 12-in., Tulsa to Kansas City, Mo. Contracted as follows, for completion March 1: 54 miles, Ponca City to Barnsdall, Okla., O. R. Borden Construction Co.; and 236 miles, Barnsdall, Okla.-Kansas City, Mo., Pacific Pipe Line & Engineers, Ltd. James Howe, superintendent for Pacific Pipe Line portion is headquartered at Chanute, Kans.; spread office at Tulsa with Ham Hamilton general spreadman and river-crossing spreadman; spread office at Dewey, Okla., Loue Robertson, spreadman; and spread office at Paola, Kans., Larry Webb, spreadman.

355 miles, 12-in., authorized, Kansas City through Omaha and Sioux City, Iowa, to Sioux Falls, S. D.

189 miles, 12-in., authorized, Kansas City to Des Moines, contracted as follows: Trojan Construction Co., two 38-mile southern sections; Brodie Construction Co., 38-mile middle section; R. H. Fulton & Co., two 38-mile northern sections.

50 miles, 8-in., authorized, Cushing-Drumright-Tulsa, Okla.; Trojan Construction Co., contractor.

Phillips Petroleum Co.—155 miles 6-in., extension to present 200-mile line from Phillips, Tex., to LaJunta, Colo., on to Denver.

Standard Oil Co. (Ohio).—38 miles 8-in., authorized, Toledo to Fostoria, Ohio.

Salt Lake Pipe Line Co.—242 miles, 6-8-in., Boise, Idaho-Pasco, Wash., planned. Contracted as follows: Morrison-Knudson Co., Inc., Macco Corp., and Bechtel Corp., section from Boise to Baker, Idaho; Pacific Pipeline & Engineers, Ltd., Baker to Pasco, Wash.

Natural-Gas Pipe Lines—Domestic

Alabama-Tennessee Natural Gas Co.—80 miles 10-in., under way, Selmer, Tenn., to Muscle Shoals, Ala.; 35 miles 8-in., authorized, Muscle Shoals to Decatur, Ala.

Algonquin Gas Transmission Co.—276 miles, Lambertville, N. J., to Boston area, proposed.

492 miles laterals, New England area, proposed.

Atlantic Gulf Gas Co. (United Gas Pipe Line Co.)—1,530 miles, planned, Alabama-Florida-Georgia-South Carolina.

Central Hudson Gas & Electric Corp.—40 miles, authorized, Tuxedo, N. Y., station, Home Gas Co. line now under construction, to Poughkeepsie, N. Y.

Central Kentucky Natural Gas Co.—36 miles, 12-20-in., planned, Kentucky loops.

Chicago District Pipe Line Co.—41 miles, 24-in., planned, Joliet, Ill., to Chicago.

City of Indianapolis, Ind., Inc.—55 miles

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TENNESSEE GAS TRANSMISSION LINE

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Mid-Valley Pipeline Company will construct and operate a 1000-mile crude oil pipe line from Texas to Ohio. The proposed pipeline will be operated as an inter-state common carrier and will be one of the largest crude lines in this country.

WESTERN is furnishing the Shell and Tube Jacket Water Coolers for the engine driven pump stations on this Mid-Valley line.

Full capacity of the line to Cincinnati will be about 150,000 bbl. a day, with a capacity of 140,000 bbl. a day at the Lima terminus. The project includes construction of seven main pumping stations; two spur-line pumping stations, and four oil terminals, as well as the laying of 1000 miles of pipe.

WESTERN FURNISHES HIGH PRESSURE GAS COOLING COILS FOR TENNESSEE GAS 1950 EXPANSION PROGRAM

Continuing its expansion program, Tennessee Gas, in 1950, will extend its existing system by construction of approximately 395 miles of 26-in. main line from northeastern Kentucky to the vicinity of Buffalo, New York; construction of 909 miles of second and third loops along the existing main line in Texas, Louisiana, Arkansas, Mississippi, Tennessee, Kentucky, and West Virginia; and additional compressor units. The increased capacity of the Tennessee system will be 340,000,000 cubic feet daily.

WESTERN is furnishing the major portion of the gas cooling coils on the TGT system as it did in the years 47-48-and 49.

WESTERN LUBE OIL AND ENGINE WATER COOLERS TO GREAT LAKES PRODUCTS PIPELINE

In order to meet traffic needs, Great Lakes Pipeline Company is now laying 1298 miles of 12-in. line, and 150 miles of 8-in. pipe, along existing routes, together with attendant pumping stations. **WESTERN has been awarded the contract for furnishing cooling equipment for this tremendous products line.**

When completed the Great Lakes system will have a daily capacity of 176,200 bbls., approximately double its present capacity

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16-in., proposed, Indianapolis to Texas Eastern Transmission Corp.'s system.

Cities Service Gas Co.—47 miles, 3-4-16-in. planned, in Kansas.

Coastal Pipe Line Co.—1,000 miles, planned, Texas to Norfolk, Va.

Colorado-Wyoming Gas Co.—41 miles, planned, Greeley, LaSalle, and Windsor, Colo., areas.

Commonwealth Natural Gas Corp.—537 miles, 20-in., planned, West Bend, Ky., to Norfolk, Va.

200 miles, planned, Green County, Virginia, to Norfolk.

East Tennessee Natural Gas Co.—185 miles, 16-in., Lobelville-Chattanooga, Tenn., contracted by Walters & Saigh Construction Co., for construction in 1950; 120 miles, 12-in., Chatanooga-Knoxville, Tenn.; contracted by Walter and Saigh Construction Co., for construction in 1950; 100 miles of laterals to be laid in 1950. Construction 150 miles, 16-in., Knoxville-Bristol, Tenn., under consideration.

El Paso Natural Gas Co.—All work done by company crews.

Looping of 26-in., New Mexico-California line and connection with Pacific Gas & Electric Co. at Needles, Calif. 352 miles, 30-in., completion November 1950.

450 miles, 30-in., under construction, Eunice, N. M.-Blythe, Calif., looping; completion March 1950.

450 miles, 24-in., planned, San Juan basin, New Mexico to Franconia, Ariz.

Home Gas Co.—70 miles, planned, Orange, Sullivan-Rockland counties, New York-Cattaraugus County, New York, areas.

Jersey Central Power & Light Co.—39.4 miles, 10-in., planned, New Jersey to Coast system, Texas Eastern Transmission Co.'s Big Inch.

Michigan-Wisconsin Gas Co.—185 miles, 4-14-in. laterals, Milwaukee-Fond du Lac, Sheboygan, and Green Bay, Wis., under construction; C. C. Griffis Construction Co., contractor; Paul Means, superintendent for Lake Del Mort crossing.

Montana-Dakota Utilities Co. and Montana-Wyoming Gas Pipe Line Co.—340 miles, 12¾-in., planned, Worland, Wyo., to Cabin Creek, Mont.; R. A. Conyes Construction Corp., contractor; Al Poggi, general superintendent; Chester Kincaid and Jimmy Alman, spreadmen.

Montana Power Co.—83 miles, 12¾-in., planned, Butte to Bozeman, Mont.

New York State Natural Gas Corp.—53½ miles 16-in., loops, Pennsylvania.

Northeastern Gas Transmission Co.—511 miles, up to 20-in., planned, in New England area.

Northern Natural Gas Co.—41 miles, 20-in., under construction, Southwest from Garden City, Kans.; R. H. Fulton & Co. contractor.

597 miles of looping in 10 sections, contracted as follows: R. H. Fulton & Co., loops 1 to 5: loop 1, 40.2 miles, 26-in., extending northward from a point 28.7 miles north of Skellytown station in Pampa, Tex., area; loop 2, Beaver, Okla., station, 74.9 miles, 26-in.; loop 3, Mullinville, Kans., station, 33¼ miles, 26-in.; loop 4, Bushton, Kans., station, 72½ miles, 26-in.; loop 5, from a point west fo Garden City, Kans., to Bushton, Kans., station, 155 miles, 20-in. Midwestern Constructors, Inc., loops 6 and 7; loop 6, from a point 29 miles northeast of Palmyra, Nebr., station, 43.4 miles, 26-in. to Oakland, Iowa, station; loop 7, from a point 17.8 miles northeast of Oakland, Iowa, station, 65.9 miles, 26-in. R. B. Potashnick, loops 8 to 10: loop 8, southwestward from Ventura, Iowa, station, 31.2 miles, 26-in.; loop 9, northward from Ventura station, 41 miles, 26-in.; loop 10, from the north end of a 26-mile gap beyond loop 9, where another loop will be built consisting of 39½ miles, 26-in.

Northwest Natural Gas Co.—750 miles planned; Washington, Oregon, and Idaho.

Pacific Gas & Electric Co.—506 miles 34-in., under construction, Topock, Ariz.-Milpitas, Calif.; Bechtel-Price-Conyes, contractor; spread office; R. L. Bowman, general superintendent.

Panhandle Eastern Pipe Line Co.—356 miles, 26-in., authorized, looping in Texas, Oklahoma, Kansas, Missouri, Illinois, Indiana, Ohio, and Michigan.

Peoples Gas Light & Coke Co.—Planned 42 miles, 24-in., Joliet-Chicago, Ill.

Phillips Petroleum Co.—25 miles gathering system in West Edmond, Okla., field, under construction; Vaughn & Taylor Construction Co., Inc., contractor; spread office Edmond, Okla.

Piedmont Natural Gas Corp.—1,350 miles, 20-in., planned, Greenville, Miss., to Norfolk, Va.

Plains Natural Gas Co.—78 miles, gathering system, Oklahoma-Kansas area, Hugoton field. Contracted by: Arey-Phillips Construction Co., Amarillo, Tex.; Tulsa Pipe Coating Co., Mid-Western Constructors, Inc., Engineering and supervision. Latter firm represented by Lyle DeWitt.

Roanoke Pipe Line Co.—30 miles 8-in., Gala, Va., to Roanoke, authorized.

South Jersey Gas Co.—77 miles, planned. Camden to Atlantic City.

Southern California Gas Co.—80 miles 30-in., Whitewater to Puente, Calif., planned.

Southern Natural Gas Co.—138 miles, 20-22-in., planned, Chattanooga, Tenn., to Lexington, Miss.

375 miles, 24-in., planned, Gwinville, Miss., to Atlanta.

225 miles, 16-in., planned, Colfax, Ga., extension.

110 miles, 11-in., considered; extension

314 miles, 18-in., planned; extension.

171 miles, 16-in., planned; extension.

118 miles, 13-in., planned; extension.

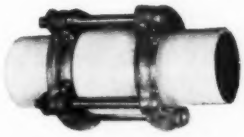
Southern Union Gas Co.—78 miles, 8-10-14-in., planned, New Mexico loops and laterals.

Tennessee Gas Transmission Co.—65 miles, 16-in., planned, Ohio-Pittsburgh spur.

790 miles, 20-26-in., planned, Burnaugh, Ky., to Boston, including 400-mile line to Buffalo.

992 miles, 30-in., planned, first 150 miles of loops to be laid at Monroe, La., Greenville, Miss., Midland and Portland, Tenn.

54.2 miles, 30-in., under construction,



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FIX LEAKS-without shutting down

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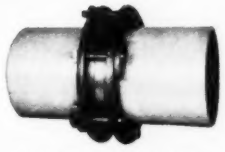
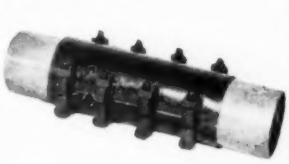


POROUS-WELD CLAMP

Style 55, for repairing circumferential weld leaks.



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White Bluff area to Joelton, Tenn., area, contracted to Morrison Construction Co.

36.1 miles, 30-in., under construction, Glasgow, Ky., area to Joelton area, contracted to Morrison Construction Co.

18.1 miles, 30-in., under construction Union City to Buckeye, Ky., Anderson Brothers Corp., contractors.

27.7 miles, 12-in., under construction, El Campo, Tex., to near Traitor, Tex.; Massey Construction Co., contractor.

25 miles, 30-in., Hardeman and McNairy counties, Tennessee; H. C. Price Co.; field office, Selmer, Tenn.; J. A. Reutzel, spreadman.

70 miles, 26-30-in., between stations 104 and 110; Anderson Brothers Corp.; field office, Richmond, Ky.; E. C. McCoy and Arkie Hobson, spreadmen.

170 miles of 26 and 30-in., contracted by Anderson Brothers Corp., in Kentucky.

Texas-Eastern Transmission Corp.—1,400 miles planned, Texas to Pittsburgh loops.

108 miles 16-in., authorized, Provident City to Baytown, Tex.

Texas Gas Transmission Corp.—103 miles, 20-in., Carthage, Tex., to near Lisbon, La., (Sharon); under construction, N. A. Saigh Co., Inc., contractor; Carthage, Tex.; Bob Floyd, representative. Construction subcontracted: (1) Fowler Brothers, 43 miles from Carthage to Red River, field office at Carthage; M. C. Johnson, spreadman; (2) 63 miles to Sharon station, Oklahoma Contracting Co. (J. R. Horrigan) field office at Minden, La.; Ed Flanagan, spreadman.

32 miles, planned, Slaughters, Ky., to Evansville, Ind.

Texas Illinois Natural Gas Pipeline Co.—1,400 miles, 30-in., planned, La Gloria field, Texas, to Joliet, Ill.

58-mile, 20-in. lateral, Joliet terminal to connection with Natural Gas Pipeline Co. of America near Volo, Ill.

Transcontinental Gas Pipe Line Co.—Texas-New York 1,840 miles, 30-in., main line and 500 miles, 4 to 22-in., gathering line. Section of 605 miles of 30-in. nearing completion.

Section (unnumbered), Rio Grande Valley to Eunice, La., 502 miles; contracts not let. Section 6, Newman, Ga., to Danielsville, Ga., 108 miles; Williams Brothers Co.; field office, Monroe, Ga.; Thelmer Davis, spreadman. Section 7, Danielsville, Ga., to Saluda River, South Carolina; 86 miles; Williams Brothers Co. Section 8, Saluda River, South Carolina, to Catawba River, North Carolina, 102 miles; R. H. Fulton & Co. Section 9, Catawba River, North Carolina, to North Carolina-Virginia boundary, 100 miles; R. H. Fulton & Co.; A. A. Corrigan, superintendent; Clark Williams, general superintendent. Section 10, North Carolina-Virginia boundary to James River, Virginia; 86 miles; O. R. Smith Contracting Corp. Section 11, James River, Virginia, to Potomac River, Virginia; 110 miles; O. R. Smith Contracting Corp. Section 12, Potomac River, Virginia, to Susquehanna River, Pennsylvania, 76 miles; Associated Engineers & Contractors, Inc. Section 13, Susquehanna, Pennsylvania, to Delaware River, 90 miles; Wunderlich & Griffis Construction Co. Section 14, Delaware River to Hackensack River, New Jersey, 61 miles; Wunderlich & Griffis Construction Co. Section (unnumbered), Hackensack River, New Jersey, to Hudson River, New York, 23 miles; Oklahoma Contracting Co.; field office, Edgewater, N. J.; M. E. Shiflett, spreadman.

Trunkline Gas Supply Co.—1,775 miles, 10-26-in., planned; includes 740-mile, 26-in. main line from Lake Charles, La., to Tuscola compressor station on Panhandle Eastern Pipe Line Co., and 1,035 miles, 10-24-in. Lake Charles, La., to McAllen, Tex., field lines, pending FPC approval of changed plans.

United Fuel Gas Co.—32 miles, 20-in., authorized; Roane, Calhoun, and Wetzel counties, West Virginia.

United Gas Pipe Line Co.—90 miles, 16-in., planned, West Bay field to New Orleans.

105.6 miles, 20-in., authorized, loop line paralleling Carthage, Tex.-Sterlington, La., and extending on to near Monroe, La.

26 miles in Louisiana conecting with East Texas system, planned.

United Natural Gas Co.—29 miles, 12-in., authorized, laterals, Elk County, Pennsylvania.

Virginia Natural Gas Co.—153 miles, planned, Buckingham to Richmond and Portsmouth, Va.

Crude-Oil Pipe Lines—Foreign

Interprovincial Pipe Line Co. (Imperial)—1,150 miles, 16-20-in., Edmonton area, to Superior, Wis.; contracted as follows: 480 miles, 20-in., Edmonton-Regina, Canadian-Bechtel, Ltd., associated with Fred Mannix Co., Calgary, Alta.; 340 miles, 16-in., Regina to Gretna, Man., Williams Brothers Corp.; 360 miles, 18-in., Minnesota and Wisconsin, Anderson Brothers Corp. (Lake Head Pipe Line Co., Inc.).

Iraq Petroleum Co., Ltd.—620 miles, 16-in., Kirkuk-Haifa, Palestine, shut down.

556 miles, 30-32-in., planned, Kirkuk, Iraq-Banias, Lakatia (Bechtel).

Middle East Pipe Line Co.—800 miles, 34-36-in., planned, Iran-Levantine Port.

Montreal Pipe Line Co., Ltd.—(See Portland Pipe Line Co. item in domestic crude oil list.)

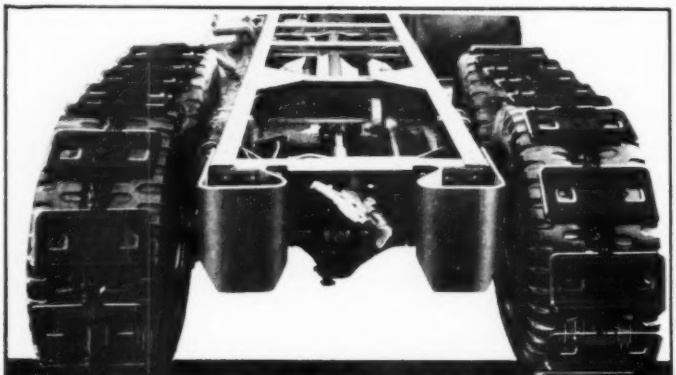
Petroleos Mexicanos—280 miles, 12¾-in., authorized, Poza Rica to Salamanca, Mexico.

Santos Jundial Railroad—30 miles, 18-in., planned, Santos to Sao Paulo, Brazil.

Trans-Arabian Pipe Line Co.—1,067 miles, 30-31-in., under construction, Abqaiq, Saudi Arabia, to Sidon, Lebanon; International Bechtel, Inc., Williams Brothers Corp., Graver Tank & Mfg. Co., and Chicago Bridge & Iron Co., contractors.

Yacimientos Petroliferos Fiscales de Argentina.—25 miles, under way, Tupungato-Lujan de Cuyo.

409 miles, under way, Plaza Huincul-Bahia Blanca.



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Additional pads to fit larger tires, **$6.50** each, freight additional.

Products Pipe Lines—Foreign

Petroleos Mexicanos.—160 miles, 10¾-in., authorized, Minatitlan to Salina Cruz, Mexico.

Cia. des Pipe Lines Petroliers Francias.—150 miles, 10-in., planned, Le Havre to Paris, France.

Colombian Government.—268 miles, planned, Puerto Berrio to La Dorada, 90 miles; Puerto Berrio to Medellin, 103 miles; Buena Ventura to Cali, 75 miles.

Northern Pipe Line, Ltd.—300 miles, 10-in., planned, Montreal to Toronto, Canada.

Santos Jundial Railroad.—40 miles, 10-in., planned, Santos to Sao Paulo to Campinas, Brazil.

Natural-Gas Pipe Lines—Foreign

Direccion General del Gas del Estado.—310 miles, planned, Plaza Huincul to Neuquen, Argentina, to the vicinity of General Conesa, Argentina.

62 miles, Comodoro Rivadavia to Caleto Olivia, under way.

Northwest Natural Gas Co.—950 miles, 24-in., planned, Alberta fields to Vancouver, B. C., Seattle, Wash., and Portland, Ore.

Petroleos Mexicanos.—205 miles, 16-in., considered, Monterrey to Torreon, Mexico. 260 miles, 20-in., considered, Monterrey-Tampico-Poza Rica area, Mexico.

Petroleos Mexicanos, Mexican Gas Co., and Industrial Gas Co.—600 miles, planned, Reynosa, Tamaulipas to Mexico City, D. F., Mexico.

Westcoast Transmission Co., Ltd.—1,406 miles, 30-in., planned, North Alberta, Vancouver, B. C., and northern California.

Western Pipe Lines.—710 miles, 22-24-in., planned, Alberta fields, Saskatoon, Alta., to Winnipeg, Man., Canada.

Gas Hearing Canceled

A gas rate-schedule hearing was canceled by Federal Power Commission last week after Atlantic Seaboard Corp., Charleston, W. Va., settled its differences with two Washington, D. C., area gas companies, Washington Gas Light Co., and Washington Gas Light Co. of Maryland. The latter two firms filed protests to Atlantic Seaboard's rate schedule which FPC suspended early this year.

BOOKS

PETROLEUM REFINING. Published by Colorado School of Mines, Golden, Colo., as Volume 45, No. 2A of the Quarterly of the Colorado School of Mines. 162 pp. $2.

This volume is a number of the seventy-fifth anniversary volume entitled "Mineral Resources in World Affairs," which will make available all of the papers presented and much of the discussion at the conferences on the occasion of the school's seventy-fifth anniversary. The current issue contains the papers delivered at the conference on petroleum refining September 30 and October 1, 1949. Included are "The Cracking of Petroleum," by Edward W. Isom, Sinclair Refining Co., New York City; "Commercial Dehydration of Normal Butane," by Harrison L. Hays and Edward Dolezal, Phillips Chemical Co., Bartlesville, Okla.; "Ethylene Production by Thermal Cracking of Propane-Ethane Mixtures," by C. K. Buell and L. J. Weber, Phillips Petroleum Co., Bartlesville; "Petroleum-Refining Instrumentation," by H. M. Schmitt, Minneapolis-Honeywell Regulator Co., Philadelphia; "Research in the Petroleum Industry—Today and Tomorrow," by C. K. Viland, Tide Water Associated Oil Co., Matrinez, Calif.; and "Low-Temperature Distillation Assays of Representative Western United States and Alaska Coals," by V. F. Parry, J. B. Goodman, and Manuel Gomez, U. S. Bureau of Mines.

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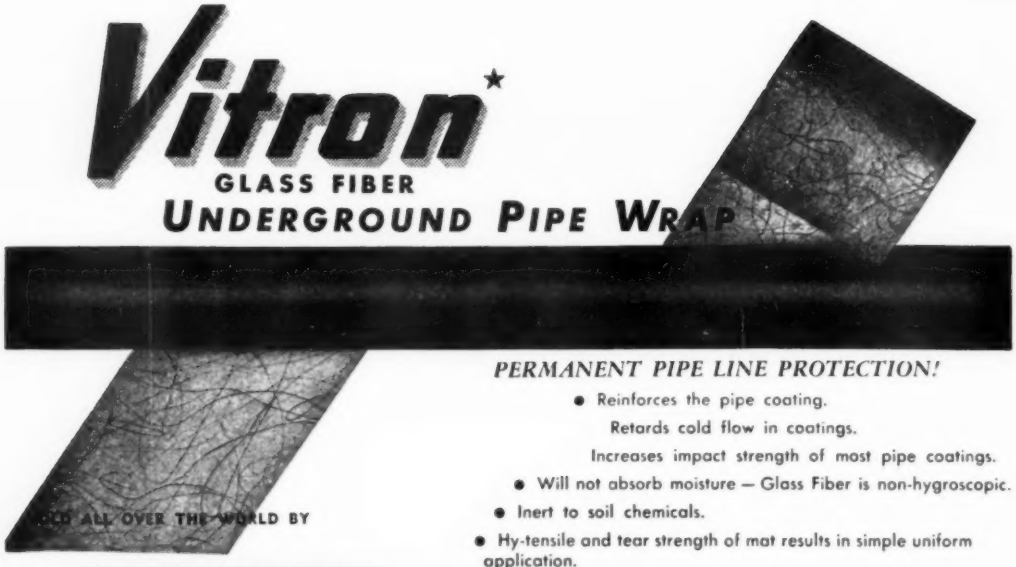

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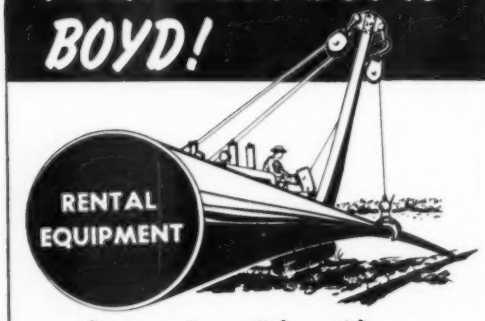

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PIPE LINES

Interprovincial Proposes Redwater-Edmonton Line

Interprovincial Pipeline Co., which is constructing a crude-oil pipe line from Edmonton, Alta., to Superior, Wis., has asked permission from the Board of Transport Commissioners to construct a 35-mile pipe line from the Redwater field to the intake of the main trunk at Edmonton.

Capacity of the line would be about 100,000 bbl. a day. A hearing on the application began March 6.

The feeder line would connect up with a 54-mile gathering system of Imperial Oil, Ltd., at the Redwater field. The intake of the main trunk would also be fed from a 50-mile gathering system in the Leduc-Woodbend and Golden Spike fields. At present these lines feed the Imperial Oil refinery at Edmonton. A 1½-mile extension from the refinery would close the gap to the take-off of the main trunk line.

Transcontinental Permitted To Change Size of Line Pipe

Federal Power Commission has permitted Transcontinental Gas Pipe Line Corp. to substitute different pipe sizes on certain sections of its previously authorized Texas-to-New York City pipe-line project, which is now nearing completion.

The substitutions include 30-in. pipe to replace the 26-in. pipe authorized on 104 miles of line extending from Chester Junction, Pa., to Paterson Junction, N. J., adding an estimated $1,295,778 to the cost; 258 miles of 30-in. pipe to replace 26-in. pipe between Markham field, Texas, and Opelousas, La., at an estimated additional cost of $2,863,961; 24-in. for the 26-in. pipe authorized on a 107.3-mile section in Texas between the La Gloria lateral and a point near the St. Charles lateral, at a saving of $986,655 in the over-all project cost; 41.3 miles of 14-in. pipe for the 20-in. pipe authorized between the Sun lateral and the La Gloria lateral in Texas, saving an estimated $554,161; and 10-in. pipe for the 20-in. pipe authorized on a 36.4-mile section between the Lacy field and the Sun lateral, in Texas, at an estimated saving of $799,459.

Electrolytic Survey Being Made for Line Protection

An extensive electrolytic survey is being undertaken to aid in preparing for protection of pipe lines and other structures on Staten Island and in the Elizabeth, N. J., metropolitan area.

The survey is being conducted by a group of engineers including A. V. Smith, consultant for Public Service Electric & Gas Co. of New Jersey, Elizabethtown Gas Co., and New York & Richmond Gas Co.; Francis Ringer, Texas Eastern Transmission Corp.; and G. C. Doss, Standard Oil Develop-

Lowering in 34-in. pipe near Needles, Calif., in the construction of the 510-mile, Topock, Ariz.-Milpitas, Calif., line now being laid for Pacific Gas & Electric Co. by Bechtel-Price-Conyes, contractor. This 34-in. pipe has 7 16-in. wall thickness, and weighs 192 lb. per ft. This is the largest diameter pipe ever used for an entire trunk line for the petroleum and natural-gas pipe-line industry.

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ment Co. The network method of analysis developed by Dr. J. M. Pearson, Sun Oil Co., has proved to be valuable in producing and evaluating field data quickly and accurately for the survey.

Scurry Outlet to Be Built By Texas-New Mexico Firm

A 37-mile 10-in. crude-oil pipe line will be constructed by Texas-New Mexico Pipe Line Co. in West Texas, through the Kelly Canyon and North Snyder pools into the southwest section of Kent County.

Field survey of the proposed route is already under way. The crude will begin flowing at the Basin Pipe Line System's Colorado City, Tex., station in Mitchell County and extend through Kelly Canyon and North Snyder pools in Scurry County and to the southwest section of Kent County.

Specifications are being prepared and contract will be awarded for the line's construction soon, the company reported.

In addition to the main trunk line, the company will install gathering lines in the two pools, and in the southwest portion of Kent County.

Oral Argument Set March 15 On Virginia Proposal

Federal Power Commission has ordered intermediate decision procedure omitted and has scheduled an oral argument to be held March 15 in Washington, D. C., in the consolidated proceedings involving proposals to construct pipe-line facilities for natural-gas service in Virginia and the Carolinas.

Applications involved in the proceeding were filed by Commonwealth Natural Gas Corp., Virginia Gas Transmission Corp., Piedmont Natural Gas Corp. and Tennessee Gas Transmission Co.

Commonwealth and Piedmont are proposing, among other things, to transport and sell natural gas for resale in Richmond and Norfolk, while Virginia Gas is proposing to deliver and sell natural gas to Commonwealth. Tennessee Gas is seeking authorization to sell gas to United Fuel Gas Co. for resale to Virginia Gas to enable the latter company to supply Commonwealth's requirements.

In addition to the Virginia markets, Piedmont is proposing to serve the Piedmont region of the Carolinas.

Omission of the intermediate decision procedure was requested by Piedmont, Commonwealth and Virginia Gas. The hearing, which commenced September 14, 1949, is still in progress on the amended application of the Commonwealth company made on February 28, 1950.

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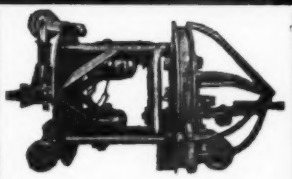

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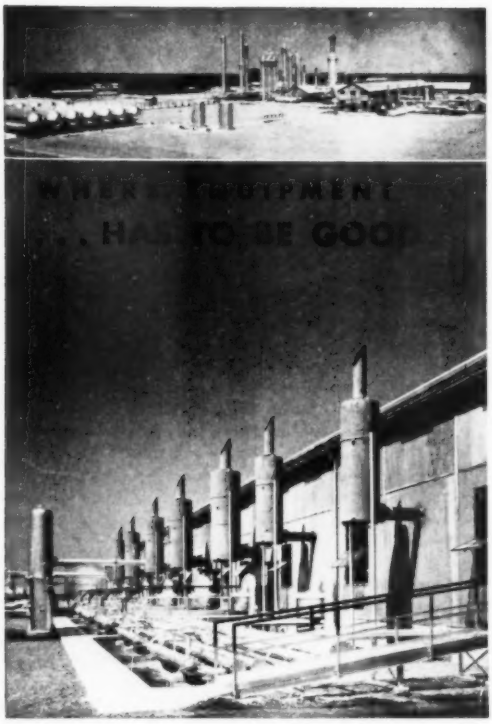

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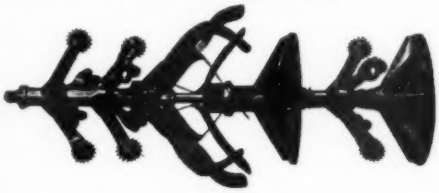

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NATURAL GAS

El Paso Authorized to Make Changes in Line Facilities

Federal Power Commission has authorized El Paso Natural Gas Co. to make changes in three previously authorized pipe-line projects located in Texas, New Mexico, and Arizona.

The facilities as previously authorized are designed to deliver 405,000,000 cu. ft. of gas per day to Southern California Gas Co. and Southern Counties Gas Co. of California, and 250,000,000 cu. ft. daily to Pacific Gas & Electric Co.

El Paso said the proposed changes are necessary because of proration orders issued by the Railroad Commission of the State of Texas changing the amount of oil and flare gas that can be taken from the Permian basin, and in order to have a more efficient system for the delivery of the authorized volumes.

Estimated cost of the additional facilities to be constructed is $12,952,069. However, the company will save an estimated $9,338,972 on previously authorized facilities which will not now be constructed, making a net additional expenditure of $3,613,097. El Paso said it has sold $12,000,000 in first mortgage bonds and $16,000,000 in sinking-fund debentures from which it will obtain funds to meet the construction costs.

The changes involve some new pipe line which was not included in the previous plans and other line which would be substituted for certain sections of the system as previously authorized. In addition, there will be changes in compressor stations, purification, dehydration and absorption plants, and in field and branch lines.

Colorado Interstate Gas' Tariff Accepted by FPC

Colorado Interstate Gas Co.'s natural-gas tariff, Volume No. 2, suspended in May 1949 by Federal Power Commission, has been allowed by FPC to take effect as of February 1.

In an order of last November 2, the commission directed Colorado Interstate to continue in effect in Volume No. 2 of the tariff the provisions of the 1931 contract covering sales of gas to Natural Gas Pipeline Co. of America.

In the November 2 order, FPC found that a contract on file as an effective rate schedule shall be continued in effect until it is changed in accordance with the Natural Gas Act, and directed Colorado Interstate to restate all presently existing provisions of the 1931 contract and to refile the volume for commission approval.

At the time of the suspension last May, FPC said that the tariff, filed by Colorado Interstate under recent amendments to the commission's rules, involved certain changes in the existing rate schedule for the sale of gas to Natural Gas Pipeline that may be "unjust, unreasonable, and unduly discriminatory."

Farris Forms New Gas Company in Texas

R. B. Farris, Fort Worth, has announced the organization of the Parker County Gas Co. which will purchase gas from two wells drilled in northeastern Parker County late in 1949. These two wells are estimated capable of producing 6,000,000 cu. ft. of gas daily.

Gas service is to be extended to Springtown, Azle, and surrounding communities as far south as Lake Worth.

Curtis-Crowell Co., Bryson, Tex., has laid the first leg of $1\frac{1}{2}$ miles of $4\frac{1}{2}$-in. line from the wells to Springtown. Upon completion of lines in Springtown, about 9 miles of pipe line will be laid to Azle.

East Tennessee Natural's Financing Plan Approved

East Tennessee Natural Gas Co.'s proposed plan for financing its Lobelville-Chattanooga - Knoxville pipe line has been authorized by Federal Power Commission. Construction of the line was authorized by the commission January 30, 1948.

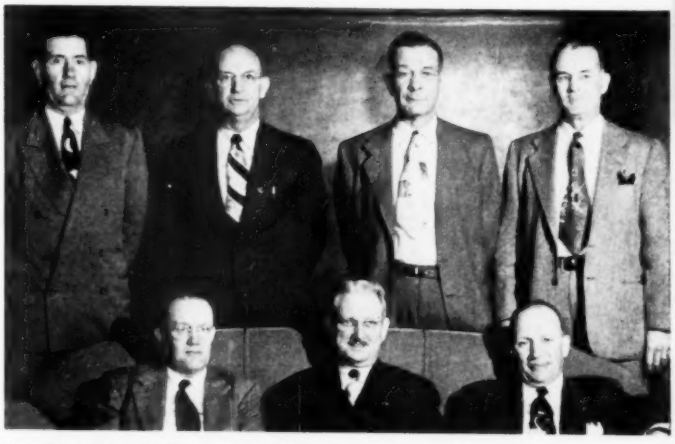
The company's financing plan will provide funds required for a tie-in line in the Knoxville area, as well as for the Lobelville-Chattanooga-Knoxville line. Total cost of these facilities is estimated at $11,765,900. The company proposes to raise funds through issuance and sale of bonds.

Peoples Gas Has Adequate Fuel for Line, FPC Told

Peoples Gas Light & Coke Co. has acquired enough gas reserves for the initial needs of its proposed 1,200-mile pipe line from Texas to the Chicago area, the firm told Federal Power Commission at a recent hearing in Washington, D. C. The line would boost Chicago's gas supply by 50 per cent.

Peoples Gas expects construction to begin this fall, and right-of-way is now being acquired.

Initial cost of the pipe-line project will be $120,000,000. Natural Gas Pipeline Co., a subsidiary, will operate the line.



***SHORT-COURSE EXECUTIVE COMMITTEE.**—Above are members of the executive committee of the Southwestern Gas Measurement Short Course, who are preparing for the 1950 course which opens in Norman, Okla., April 12, and continues through April 13 at the University of Oklahoma. Sitting, left to right: Ray L. Rountree, United Gas Pipe Line Co., Shreveport; Max K. Watson, natural-gas consultant, Amarillo; W. H. Carson, dean, College of Engineering, University of Oklahoma. Standing, left to right: Earl Kightlinger, Alabama-Tennessee Gas Co., Florence, Ala.; R. M. Scofield, Lone Star Gas Co., Dallas; E. C. McAninch, Oklahoma Natural Gas Co., Ardmore, Okla.; and C. E. Terrell, Southern Natural Gas Co., Birmingham.*

GOOD REASON FOR USING THE GLOBE JUNK CATCHER

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A Typical GLOBE *Basket Full*

When this hole opener twisted off above the reaming cutters (depth about 3,500 feet) it presented a real fishing problem. The tool pusher promptly called for a Globe Junk Catcher which made complete recovery as illustrated. Note how the catcher dog (arrow) is pressed firmly against the hole opener shank, holding it secure for the long trip to the surface.

Keep in touch with your nearest Globe representative. He can deliver a complete Junk Catcher outfit to your rig, ready to run the instant the drill string is out of the hole.

The Globe digs down, around the junk, forcing it up into the barrel. The dogs hold junk secure until removed on the derrick floor.

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Among the

Drilling Contractors

ROTARY RIGS IN OPERATION*

(United States and Western Canada)

Area—	Operating 2-27-50	Change from 2-20-50	Change from 2-28-49
Gulf Coast	501	+15	—121
W. Tex.-N. M.	672	— 9	+130
Ark.-N. La.-E. Tex.	140	+12	— 8
Oklahoma	241	+14	+ 35
Kansas	115	+15	+ 11
Illinois-Eastern	57	— 3	— 22
Rocky Mountain	60	— 4	— 31
Pacific Coast	141	+ 6	— 53
Total United States	1,927	+46	— 59
Western Canada	83	+ 3	+ 22
Total	2,010	+49	— 37

*Courtesy Hughes Tool Co.

Number of Rigs Operating Up 49 Over Week Ago

Total number of rotary rigs operating in the United States and western Canada amounted to 2,010 on February 27, 49 more than were operating on February 20. This represents a loss of 37 over comparable date last year, or February 28, 1949. Total for the United States was 1,927, up 46 over the February 20 figure, but down 59 over the figure February 28, 1949.

West Texas-New Mexico district showed the greatest increase over a year ago, with 672 rigs operating on February 27. This is 130 more than on February 28, 1949, but 9 less than were running on February 20 this year.

New Drilling Company Is Organized in Odessa, Tex.

A new drilling firm, Fleeger-Riley Drilling Co., Inc., has been organized in Odessa, Tex., with the three principal officers serving in equal partnership.

G. W. RILEY

Burtner Fleeger, Tulsa, of National Associated Oil Co., and president of Oklahoma Steel Castings Co., will serve as president of the firm, with George W. Riley, formerly drilling superintendent for Big Chief Drilling Co., as vice president, and Thomas H. Fleeger as secretary-treasurer.

The company has a Wilson Rodair

DRILLING IN SCURRY.—Above are crew members of Kerr-McGee Oil Industries, Inc.'s, Rig. 7, which is drilling on Magnolia Petroleum Co.'s 5 Van Winkle near Snyder in Scurry County, Texas. Front row, left to right: Ray Weeks, derrickman; George Collins, helper; and N. C. Ingram, motorman. Back row, left to right: Jess Miller, driller; H. W. Freeman, tool pusher; and Norman Snipe, helper.

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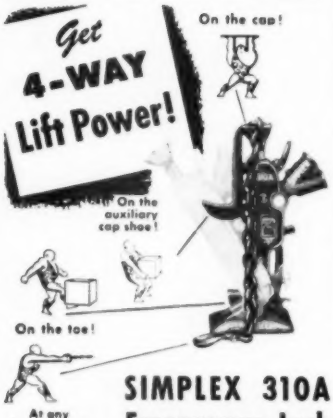

SIMPLEX 310A Emergency Jack

Here's a Simplex to save time and manpower on scores of oil field jobs. Ideal for close quarter operation; for safe jacking of mobile equipment and skidding rigs. Tilts on base for angular jacking. Lifts full 15 tons capacity at any of four points listed above. Send for Bulletin: Oil 49.

Simplex
LEVER · SCREW · HYDRAULIC
Jacks
TEMPLETON, KENLY & COMPANY
1034 South Central Ave., Chicago 44, Illinois

Giant three-engine rig, and will operate primarily in the West Texas area. The firm contemplates purchasing additional rigs in the near future.

Thomas H. Fleeger formerly was

T. H. FLEEGER

BURTNER FLEEGER

with Empire Machinery Co., Odessa, and Riley, before joining Big Chief Drilling 4 years ago as drilling superintendent, had spent 10 years with M. B. K. Drilling Co. in that capacity.

New Firm Incorporated

A new drilling-contracting firm, Brownson Drilling Co., has been incorporated in Long Beach, Calif. Robert L. Brown is president, and William B. Fisher is vice president.

Hilburn Drilling Co. has contract to drill three wells in the White Lake field, 16-15s-1e, Vermilion Parish, Louisiana, for Union Oil Co. of California. They are the 17-A School Board, 18-A School Board, and 19-A School Board. The first two will be drilled to 6,100 ft. and the latter to 6,050 ft.

Powell & Peters Drilling Co., Great Bend, Kans., has given the Hufstutter pool of Phillips County, Kansas, a ¼-mile north extension with the 2 Davis, SW NW SE 32-1s-18w. It swabbed and flowed 20 bbl. of oil per hour, 38°-gravity, with no water, from the Lansing-Kansas City lime, with total depth 3,470 ft. Location has been staked for the 3 Davis, SW NE SE 32-1s-18w, ¼ mile east of the 2 Davis.

Longhorn Drilling Corp., Three Rivers, Tex., has contract to drill Western Natural Gas Co. 1 Great Southern Life Insurance Co., a 7,500-ft. test in the Clayton area of western Live Oak County, South Texas. Location is 510 ft. west of east line and 685 ft. north of south line of Block 51, in the Charles F. Simmons subdivision, John Buchanan Survey. The company also has contract to drill an 8,500-ft. wildcat test for Henderson Coquat and Stanolind Oil & Gas Co. in Live Oak County. The test is 1 Mrs. Clara Briam, 330 ft. north of the south line and 4,750 ft. southwest of the southeast corner of Dennis McGowen Survey A-29, Live Oak County.

NEEDS NO SEALING COMPOUND

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DRYSEAL
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PRESSURE PLUG

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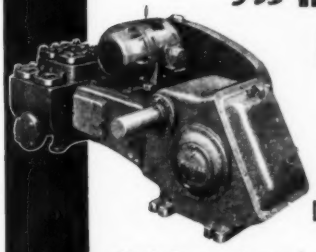

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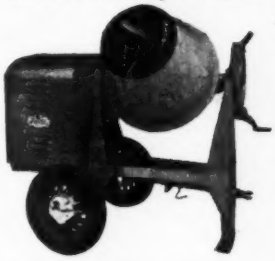

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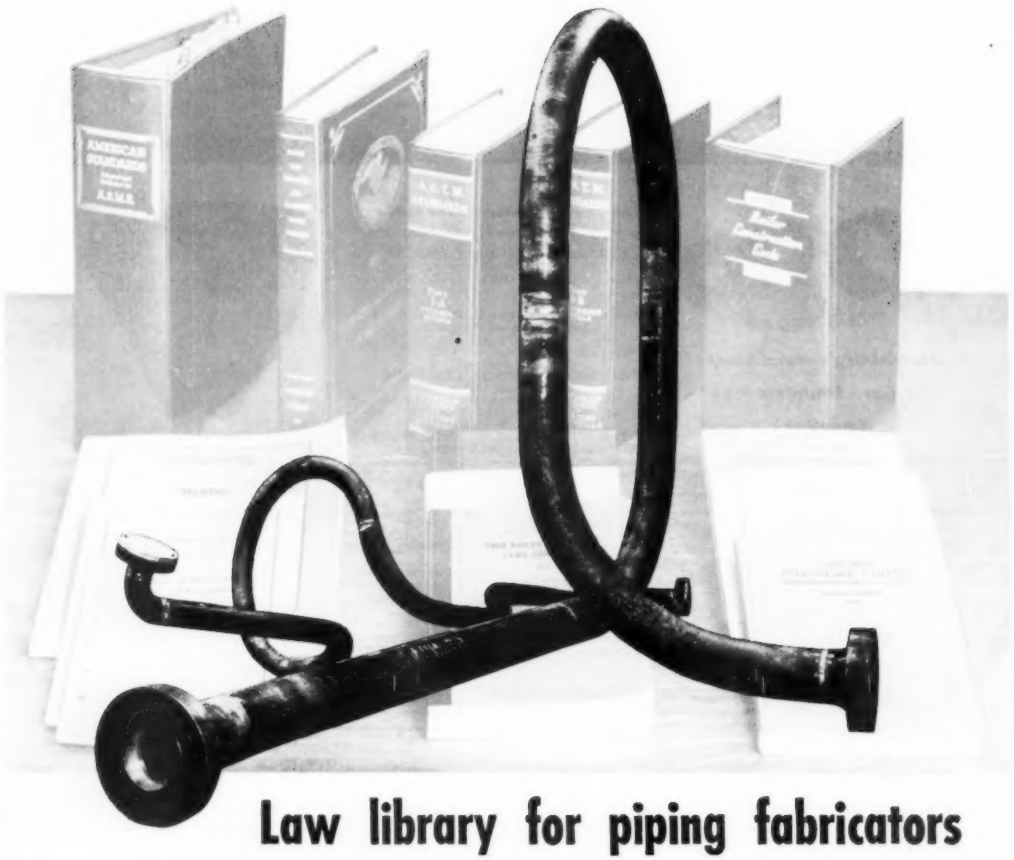

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REFINING

Drumright Cat Cracker to Begin Operation By April 1

TULSA.—A new Houdriflow catalytic cracking unit at Tide Water Associated Oil Co.'s Drumright, Okla., refinery, is expected to go on stream by April 1, the company announced here last week.

Work is nearly completed on the refinery's expansion and modernization program.

The unit is designed to charge 4,500 bbl. of oil daily with additional capacity up to 6,750 bbl. daily for recycling. It will be able to handle either Oklahoma crude or high-sulfur West Texas crude as charge stock.

Navy Lets Contracts for Crude, Petroleum Products

WASHINGTON.—Contracts for more than $80,000,000 worth of crude and products were announced last week by the Navy Department.

Included in the purchases were 960,000 bbl. of crude oil, approximately 8,200,000 bbl. of aviation fuel and 400,000 gal. of JP-3, 3,852,000 bbl. of motor gasoline, 6,890,000 bbl. of Navy Special fuel, 1,825,000 bbl. of diesel fuel, and 40,000 bbl. of kerosine.

The largest contracts in each class were: aircraft engine fuel, Esso Standard Oil Co., New York, 43,285,000 gal. for $6,504,973; 72-octane motor gasoline, Phillips Petroleum Co., Bartlesville, Okla., 1,650,000 bbl. for $5,932,080; Navy Special fuel, Richfield Oil Corp., Los Angeles, 4,500,000 bbl. for $4,455,000; crude oil, Union Oil Co., Los Angeles, 960,000 bbl. for $1,862,400, and kerosine, Standard Oil Co. (Calif.), San Francisco, 40,000 bbl. for $151,200.

Tax From Oil, Products Running Ahead of Last Year

WASHINGTON.—January revenue from the three oil taxes was slightly in excess of $48,000,000, more than $10,000,000 above the same amount last year, it was reported last week by the Bureau of Internal Revenue.

Collections for the month included $42,347,300 from gasoline against $28,772,439 in January, 1949; $4,848,994 from lubricating oil against $7,988,019, and $1,287,268 from pipe-line transportation against $1,103,872.

For the first 7 months of the fiscal year, gasoline-tax collections showed

PLANNING REFINERY CONVERSION.—Representatives of Standard Oil Co. (Ohio) and Bechtel Corp. are shown at a recent meeting in San Francisco, where discussions were held to plan conversion work at Sohio's Cleveland refinery. Seated, left to right: E. E. Kerns, supervisor of materials and equipment, Sohio; R. S. Day, Jr., legal counsel, Sohio; V. G. Hindmarsh, vice president, Bechtel; W. M. Bennett, general project engineer, Sohio; G. R. Thompson, refinery representative, Sohio; Glenn Harding, project engineer, Bechtel; E. N. Mars, process-design supervisor, Sohio. Standing, left to right: W. R. Ayers, administrative manager, Bechtel; R. B. Kilgore, Jr., liaison project engineer, Sohio; A. J. Orselli, manager, refining division, Bechtel; F. W. Meyer, chief refinery engineer, Bechtel; E. E. Dorresten, manager of engineering, Bechtel; H. F. West, chief, engineering division, Sohio; Dr. F. J. Sanders, technical manager, Sohio; E. N. Salathe, supervisor of design and construction, Sohio; K. N. Thompson, supervisor of utilities and power, Sohio; G. L. Bruno, resident job engineer, Bechtel; Abe Entingen, field engineer, Bechtel; C. T. Draney, manager, contracts and sales, Bechtel; J. Perry Yates, vice president in charge of engineering, Bechtel; Hugh Hyde, supervising engineer, Bechtel; D. J. Wilson, job engineer, Bechtel.

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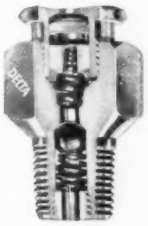
For ALL Lubricated Plug Valves



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C-12 — 1/2"
C-34 — 3/4"
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a $14,000,000 increase over the preceding year, $314,448,038 against $300,457,219, but the revenue from lubricating oil fell $4,581,000, from $47,959,509 to $43,378,198, and that from pipe-line transportation dropped $376,500, from $11,066,575 to $10,690,047, the bureau stated.

Coltex Refining to Take Permian Distress Oil

COLORADO CITY, Tex.—Coltex Refining Co. has entered into an agreement with operators in a number of marginal pools on the east side of the Permian basin to take 12,000 bbl. of distress oil daily from the area.

Coltex said the figure of 12,000 bbl. would exceed actual production in the area and would take oil which had backed up in storage during 13 months of pipe-line proration.

The commitment to take the oil from Howard-Glasscock, Iatan-East Howard, Iatan-North Howard, Snyder and Westbrook pools brought a recess in the Austin hearing, which was a resumption of one held there January 31.

Basing Point Bill May Be Heading Toward Enactment

WASHINGTON.—The O'Mahoney bill to permit sellers to quote delivered prices and absorb freight appeared this week to finally be heading toward enactment as the result of an agreement between House and Senate conferees to require only the showing of "reasonable probability" that a price discrimination would result in the lessening of competition.

What may be the final agreement on the bill was reached quickly once the House, which had held the measure up for some 7 weeks, agreed to send it back to conference as requested by the Senate January 21.

The measure will not come up for approval in either house, however, until after March 13, by which time it is hoped the Supreme Court will have handed down its decision in the Standard Oil Co. (Ind.) case, which most of the debate on the bill revolved around.

During the course of the House debate, Rep. Francis E. Walter of Pennsylvania predicted the Supreme Court will reverse the circuit court. In that case, the court upheld a Federal Trade Commission order prohibiting discrimination in prices based on charges that Standard in selling gasoline to four purchasers classified as jobbers quoted them lower prices than charged 358 other purchasers not so classified, rejecting the company's defense that the discriminatory prices were made to meet competition in good faith.

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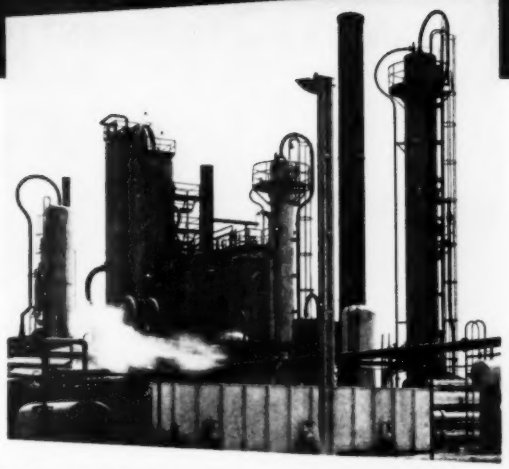

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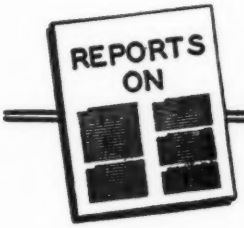

Exploration and Drilling

Rocky Mountain Outlook Picks Up

WITH all the attention focused on the Scurry County reef developments, it is easy to overlook rather promising developments in other areas. Developments recently in Powder River basin of Wyoming, for instance, are moving fast and prospects look good. Furthermore, the activity in Southwest Nebraska in the Julesburg basin is moving along in good shape.

In the southwest part of Powder River basin, the blank spot just north of Salt Creek that has been so glaringly apparent on all field outline maps, is being filled in with a very promising group of wells. The right spot finally seems to have been found.

As of the present, these are four producing spots, with four different pays producing at some point or other, and usually at least two of them producing in any given local area. The fields are Sussex, East Sussex, North Meadow Creek, and South Meadow Creek. The pays are Sussex (a stray sand above the Shannon, not known in the Salt Creek section); Shannon; second Wall Creek, and Lakota sands.

The spread of three of these fields, from north to south, East Sussex to North Meadow Creek to South Meadow Creek, is only a shade over 4 miles, and the biggest gap between any two spots only about 1½ miles. Located on three different unitized blocks, and opened by separate wildcats, they may be three small local accumulations along a regional high; or they might connect up. On an east-west trend across the high, the presently proven productive area is only about two to three locations wide.

From a regional standpoint, the Sussex-Meadow Creek area lies farther east of the west rim of Powder River basin than Salt Creek. It is almost certain there is structure present. Finding structures has never presented too much of a problem in Wyoming. The big problem has always been to find an "oily spot," a place where conditions were right for accumulation of oil in a structure.

To many veteran Rocky Mountain geologists, the most promising signs about this new area are the numerous sands that seem to carry oil, if not in one part of the area, then in another. When you add this evidence of being an oily spot to the nearness of Salt Creek field, the biggest field by far ever found in the Rocky Mountains, the signs look more encouraging than ever.

There is a lot of speculation about what regional conditions have any significance. For instance, the general trend of the Fort Union scarp makes a noticeable bulge to the northeast in this general neighborhood. In the bulge it narrows somewhat and shows lots of small transverse faulting. The areal extent of the Lance widens inside (to the west) of the bulge in the scarp, then narrows rapidly to the northwest, and also narrows somewhat to the south, although to a far lesser extent than to the northwest. Some geologists profess to see a relationship between this condition and Salt Creek field. If there is such, it might also apply to any other fields in this area. That might mean the Sussex-Meadow Creek spots. Or it may have no meaning whatsoever.

The Rocky Mountain area is full of structures, giants, big ones, medium-sized ones, and even little ones. There are roughly 175 known oil fields in the region, but 8 to 10 of them account for more than half of all the oil found. Salt Creek is by far the biggest field. So, any signs of oil near (these areas lie within about 10 miles) Salt Creek, always raise hopes that here, too, conditions for really rich oil accumulation may have repeated.

Meantime farther south, in the Glenrock townsite area, opened by the Steelco Drilling discovery about 3 months ago, the second well missed the Muddy sand which produced in the discovery, but made a well in the Dakota sand. The second well reportedly found the Muddy sand shaled out. This raised some speculation among geologists as to whether the call on the discovery well was correct; perhaps it was also Dakota instead of Muddy. They point out that there is no Muddy sand in nearby Big Muddy field, despite its name. Finding oil in the Dakota sand in the second well makes everyone feel better anyway, because the Dakota has a much better reputation as a good producer than the Muddy. The Muddy sand didn't get its name by accident.

Charles J. Deegan

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

WEST TEXAS.—General American Oil Co. 1 Peck, Ellenburger extension west of Pegasus field, flowing through 1-in. opening in tubing and still cleaning out some wash-water, produced 723 bbl. of oil, cut 6 per cent, in 15 hours. The following 13 hours it gaged 549 bbl. of oil, cut 5 per cent. Before taking potential it was making 44 bbl. of 53°-gravity oil an hour, with about 1 per cent wash water. Castleman & O'Neill 1 Feldman-Pardo, Scurry County wildcat currently holding attention, had the reef at 6,682 ft. on elevation of 2,443 ft. At last report it was said to have run pipe to around 6,883 ft., total depth, without testing.

MISSISSIPPI.—Northwest of Ellislie field, Adams County, Humble Oil & Refining Co. is reported to be installing pump to test the 1 Alberta Robinson, 20-5n-3w. On a 4-hour drill-stem test in the Armstrong (Wilcox) sand at 6,406-10 ft., the well flowed at the rate of 270 bbl. of 29.1°-gravity oil daily, through ¼-in. top and ⅜-in. bottom chokes. This recovery tends to indicate a separate reservoir from the field where 38°-gravity oil is produced.

ROCKY MOUNTAIN AREA.—Phillips Petroleum Corp. found oil in the Dakota for a new pay in the Glenrock area, Wyoming. New wildcat locations were made in northeastern Colorado following the active Denver-Julesburg Basin play. The California Co. is below 8,500 ft. at its Gusher Unit wildcat in the Uintah Basin of Utah.

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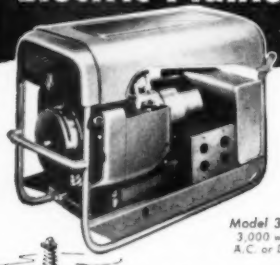

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MISSISSIPPI

Humble Moving in Pump To Test Wildcat

JACKSON.—Approximately 1½ miles northwest of Ellislie field, Adams County, Mississippi, Humble Oil & Refining Co. is reported to be installing pump to test the 1 Alberta Robinson, 20-5n-3w. This test has been drilled to 7,116 ft. and 7-in. casing has been run to 6,573 ft. On drill-stem test through perforations at 6,507-13 ft., the well recovered 830 ft. of mud and 4,875 ft. of salt water after tool had been open 1¼ hours. Another drill-stem test was run in the Armstrong (Wilcox) sand at 6,406-10 ft., and through ¼-in. top and ⅜-in. bottom chokes, on a 4-hour test the well flowed at the rate of 270 bbl. of 29.1°-gravity oil daily. After test tool was pulled, tubing was swung at 6,354 ft. and the well was swabbed but would not flow.

The 29.1°-gravity oil recovered on drill-stem test tends to indicate a separate reservoir from Ellislie field, where 38°-gravity oil is produced from the Armstrong sand.

In the Sherron field area of Jasper County, Union Producing Co. has recovered gas and condensate on two drill-stem tests in the 1 Lee Chancellor, 20-10n-11w. Operators are in the process of running a third test to total depth of 5,616 ft. in the Stanley (Eutaw) sand. Shows of gas and condensate were encountered throughout the nonpermeable upper Eutaw section, but first permeable sand was in the second City Bank zone at 5,513-29 ft. A drill-stem test at 5,515-25 ft. resulted in an unestimated flow of gas, with top pressure reaching 550 psi. in 10½ minutes, after which time testing tool was closed. Bottom-hole flowing pressure was recorded at 1,125 psi., and 10-minute shut-in bottom-hole pressure at 2,250 psi.

Drill-stem test at 5,569-90 ft., using ¼-in. top and ⅜-in. bottom chokes, resulted in recovery of 10 ft. of mud cut with gas and condensate and 12 ft. of 55.2° gravity, light yellow condensate. Bottom-hole flowing pressure was 2,525 psi. and shut-in was 2,550 psi. Operators report a total of 15 ft. of net effective sand in the second City Bank and approximately 35 ft. in the Stanley.

ALABAMA WILDCAT FAILURE

Lawrence County: B. E. Davis 1 Shirley Smith, 29-7s-6w, dry, TD 1,603 ft.

MISSISSIPPI WILDCAT FAILURES

Adams County: Dan Reynolds 1 Annie L. Brown, 27-5n-1w, dry, TD 6,561 ft.

Jones County: Sistrunk-Harris & Payne 1 Monroe Byrd et al, 27-9n-10w, dry, TD 6,304.

KANSAS

Kansas City Shows at Barton County Wildcat

KIOWA DRILLING CO. 1 Schneweis, NW NW SE 18-17s-11w, Barton County, had good oil shows in the Lansing-Kansas City after finding water in the Arbuckle. Arbuckle was called at 3,340 ft. and casing was set at 3,341 ft. When plug was drilled, hole filled with water. Operator plugged back and perforated with 25 holes at 3,231-40 ft. opposite the Lansing-Kansas City. Well swabbed 10 bbl. per hour and dropped off to 3 bbl. per hour. Further tests will be made after the pay is treated with acid. The new well is about 1½ miles west of Kraft-Prusa pool.

A Russell County wildcat about 1½ miles northeast of Cloussen pool is running casing after a show of oil on drill-stem test. Franco-Central Oil Co. 1 Kortman, SW SW NE 22-12s-14w, topped the Lansing at 2,961 ft. and a 30-minute drill-stem test at 3,000-12 ft. had a recovery of 120 ft. of oily mud. Well was drilled on to 3,280 ft., 6 ft. in the Arbuckle, with no other shows reported.

The discovery well for Cheyenne View pool in Barton County has been plugged back to Lansing Kansas City following the completion of the first offset with good production from that pay. The well, Aladdin Petroleum Co. 1 Kultgen, SW SW NW 12-19s-12w, originally completed for 120 bbl. per day from the Arbuckle, has been plugged back and casing perforated at 3,120-26 ft. and 3,144-53 ft. opposite the Lansing Kansas City. The zones were treated with 2,000 gal. of acid and a bomb potential of 2,457 bbl. was recorded.

Nadel & Gussman 1 National Gypsum Co., SW SW SE 20-30s-15w, discovery well in Turkey Creek pool in Barber County, has been plugged back to the Massey zone and is reported to be making an estimated 50 bbl. per day from perforations at 4,350-53 ft. and 4,345-49 ft. Original production was from a basal Pennsylvanian sand at total depth of 4,456 ft.

KANSAS SUCCESSFUL WILDCAT

Rice County: Sohio 1 Reif, NW NE SW 31-18s-10w, pumped 26 bbl. of oil per day from Arbuckle at 3,272-78 ft., TD

Rooks County: Shell 1 Stamper, SE NW SE 28-8s-17w, pumped 20 bbl. of oil per day from Lansing at 3,394-3,408 ft., TD 3,529 ft.

KANSAS WILDCAT FAILURES

Butler County: Scanlon & Dillard 1 Koble, NW NE NW 33-25s-6e, dry, TD 2,801 ft., Bartlesville sandy shale 2,640 ft., Mississippi lime 2,780 ft.

Clay County: Mendenhall 1 Glace, C NE 21-9s-4e, dry, TD 1,825 ft., Mississippian 1,780 ft.

Ellis County: Yarnell 1 Kippes, NW NW SE 35-13s-16w, dry, TD 3,548 ft., Topeka 2,863 ft., Heebner 3,139 ft., Lansing-

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Abandoned High Spot area—Anschutz 1 Klotz, NE NE SE 28-12s-16w, dry, TD 3,615 ft., Sooy 3,583 ft., Arbuckle 3,608 ft.

Ellsworth County: Nadel and Gussman 1 Frohreich, NW NE SE 8-17s-10w, dry, TD 3,391 ft., Heebner 2,888 ft., Lansing-Kansas City 3,021 ft., Sooy 3,313 ft., Arbuckle 3,346 ft.

Russell County: Harms-Knight 1 Scaley-Shafer, NE NE SE 1-13s-15w, dry, TD 3,186 ft.

Sheridan County: Continental 1 Pope, SW SW SE 18-7s-29w, dry, TD (?), tight hole.

EASTERN NEBRASKA WILDCAT FAILURE

Red Willow County, Indianola area: Evans 1 Fee, SW SE SW 6-3n-27w, dry, TD 3,550 ft., Heebner 3,133 ft., Lansing-Kansas City 3,166 ft., granite 3,544 ft.

SOUTHWEST TEXAS

Nueces County Gets Gas-Condensate Discovery

CORPUS CHRISTI—Curtis Singleton Drilling Co. and James R. Dougherty have completed the 1 James R. Dougherty fee for a gas-condensate discovery in Nueces County. The hole was drilled to a depth of 5,423 ft. with 5½-in. casing set on bottom. Through perforations at 5,375-77 ft., the well flowed 13,000,000 cu. ft. of gas daily on open flow. The well is in Block 7, Bluntzer Partition, Casa Blanca Grant, and was shut in with shut-in pressure at 2,083 psi.

The Superior Oil Co. 1 Minnie S. Welder, new oil-field discovery 5 miles northeast of Sinton, San Patricio County, was potentialed for 506 bbl. of 39.1°-oil daily through a 14/64-in. choke. The well is bottomed at 8,822 ft. and 7-in. production casing was set at 8,500 ft. Production is through perforations at 8,122-32 ft. The new discovery is in the Eliza H. Welder Ranch Subdivision, C. J. Franco-E and F. R. Portilla Survey, Abstracts 25 and 26.

A good show of oil was found from 905-85 ft. in the Chemical Attraction Oil Co. 1 C. J. Zwanzig, wildcat ½ mile northeast of Medina, Bandera County. The hole is at 985 ft. and part of the drill pipe was lost in the hole. Operators are now fishing and will run an electric log when the junk has been recovered.

Union Producing Co. has run a potential test on the 1 Virginia H. Tatton, oil discovery 4 miles north of the Lamar field, Aransas County. The producer flowed 229 bbl. of 55.9°-gravity oil daily through a 6/64-in. choke. Hole is bottomed at 11,515 ft. and production is through perforations at 10,505-20 ft. Tubing pressure on the test was 4,650 psi. with the casing sealed.

Producers Corp. of Nevada cored from 3,440 to 3,561 ft. in the 1 E. S. Austin, wildcat test in the John A. Winn Survey, Gonzales County, and had a slight show of oil in sand from 3,543-45 ft. Operators are preparing to drill ahead to 3,561 ft.

The 46 new locations include 16 wildcat starts, one each in Starr and Zapata counties, 2 each in Jim Hogg, Nueces, San Patricio, Atascosa and Guadalupe counties, and 4 in Duval County. There were three successful exploratory tests completed, one each in Medina, Aransas, and Nueces counties, while four were dry, one each in Guadalupe, Jim Hogg, Webb and McMullen counties.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) SUCCESSFUL WILDCATS

Aransas County: Gas-condensate discovery—Union Producing Co. 1 Virginia H. Tatton, John Durst Sur., A-51, 4 mi. N of Lamar field, 4 mi. SW of St. Charles field, top pay 10,505 ft., TD 11,515 ft., PBTD 10,920 ft., perf. 10,505-20 ft., IP

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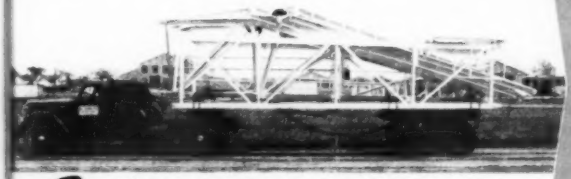

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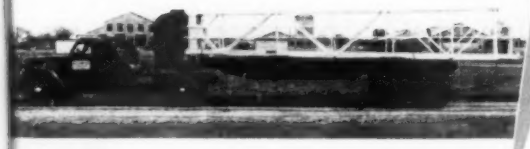

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Medina County: New oil pool—"Haby" field—H. A. Pagenkopf 1 Edwin J. Haby, John Techene Sur. 47, 5½ mi. SW of Dunlay, TD 1,270 ft., PBTD 592 ft., open hole 570-592 ft. (Escondido zone), IP: 7 bbl. oil per day on pump, 22.4° gravity.

Nueces County: Gas condensate discovery—Curtis Singleton Drilling Co. and James R. Dougherty 1 James R. Dougherty fee, Block 7, Bluntzer Partition, Casa Blanca Grant, 6½ mi. NE of Farenthold field, TD 5,423 ft., perf. 5,375-77 ft., IP: 13,000,000 cu. ft. gas, open flow no gage on condensate, 66° gravity, SIP 2,083 psi.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) WILDCAT FAILURES

Guadalupe County: C. O. Hagen 1 Isaac Allen, James M. Bell Sur., 6 mi. SW of Luling, 1 mi. S. of Sullivan, dry, TD 2,460 ft.

Jim Hogg County: Humble Oil & Refining Co. 1 Moody Ranch, Sec. 1, Fowler and Rankin Subdivision, El Sordo Grant, dry, TD 4,486 ft.

McMullen County: Atlantic Refining Co. 1 D. W. Rhode, L. W. Snowden Sur., A-921, 6 mi. N of Brazil, dry, TD 7,707 ft.

Webb County: Magnolia Petroleum Co. 1 Thomas Hetherington, Seale, Morris and Seale Sur. 491, dry, TD 1,136 ft.

TEXAS GULF COAST

McCarthy Finds New Oil Sand in New Ulm Area

HOUSTON—A new oil-producing sand has been opened in the New Ulm area of Austin County with completion of the McCarthy Oil & Gas Corp. 1 Franciska Lesikar et al, 4½ miles east of New Ulm. The well was drilled to a depth of 10,312 ft. and 7-in. casing set on bottom. A series of production tests were made, then final completion selected in perforations at 9,096-108 ft. in a new pay zone for the field. The well was gaged for 227 bbl. of 41.1°-gravity oil daily through a ¼-in. choke. The well is 3,200 ft. southwest of the company's A-1 Schiller well, which opened the first commercial oil production for the field with dual-completion at 9,467-85 ft. and 9,045-58 ft. A total of 11 sands showing oil or gas were reported in the 1 Franciska Lesikar.

The Texas Co. has opened a new deep flank pay sand in the Hull field, Liberty County, in the 7 Armelin fee. The new pay zone was perforated at 6,593-97 ft. with 24 shots, and through a 9/64-in. choke the well flowed 165 bbl. of 29.3°-gravity oil daily. The well is producing from the casing portion of the well, with casing pressure of 800 psi.

J. S. Abercrombie Co. has spudded the 20 B. R. L. D., 15,000-ft. test in Old Ocean field of Brazoria County. Located in the Charles Breen League, it will be an exploratory test within the bounds of the field.

H. A. Potter and associates have production from a new pay sand in the 1 Ritta Freeman in the Sargent area, of Matagorda County. The well was drilled to 6,705 ft. and has 7-in. casing cemented on bottom. Through perforations in the casing at 5,058-62 ft., the well flowed an estimated 32,500,000 cu. ft. of gas daily, plus an ungaged amount of distillate. Well spots in the Thos. McCoy and D. Deckro Survey.

The 40 new locations include 13 wildcat starts, 1 each in Goliad, Lavaca, Refugio, Victoria, Wilson, Chambers, Fort Bend, Jasper, and Montgomery counties, and 2 each in Wharton and Live Oak counties. There were five successful exploratory wells completed, one each in Calhoun, Austin, Brazoria, Liberty, and Orange counties, while four were dry, one each in Bee, Jackson, Live Oak, and Walker counties.

TEXAS GULF COAST (DISTRICTS 2 AND 3) SUCCESSFUL WILDCATS

Austin County: New pay at New Ulm—McCarthy Oil & Gas Corp. 1 Franciska Lesikar et al, Adam Kuykendall Sur., A-243, 4½ mi. E of New Ulm, TD 10,312 ft., top pay 9,096 ft., perf. 9,096-180 ft., IP: 227 bbl. oil per day, ¼-in. choke, GOR 1,200, TP 400 psi., 41.1° gravity.

Brazoria County: New gas discovery—H. L. Hunt 1 J. C. MacGregor Unit, Tract 14, Block "F," Alvin Townsite, HT&B Sur. 14, A-449, TD 11,032 ft., top pay 10,578 ft., 10,578-87 ft., IP: 4,400,000 cu. ft. gas daily, open flow.

Calhoun County: New pay at Powderhorn Lake—Brazos Oil & Gas Co. 2 State of Texas 33724, State Tract 49, Powderhorn Lake, top pay 5,095 ft., TD 6,000 ft., perf. 5,175-200 ft., IP: 146 bbl. oil per day, 9/64-in. choke, GOR 3,726, TP 1,700 psi., 29.5° gravity.

Liberty County: New pay at Hull—The Texas Co. 7 Armelin, S. Wickliff Sur., A-270, dual completion, TD 7,504 ft., top pay 6,593 ft. (new pay), perf. 6,593-97 ft., IP: 165 bbl., 9/64-in. choke, GOR 507, CP 800 psi., 29.3° gravity, top pay 6,770 ft., perf. 6,770-84 ft., IP: 260 bbl., ⅛-in. choke, GOR 467, TP 1,575 psi., 32.2° gravity.

Orange County: Gas discovery—Houston Oil Co. of Texas-American Republics Corp. 1 E. P. Lipscomb et al, Josiah Brick Sur., A-48, 3 mi. NE of Mauriceville, top pay 7,650 ft., TD 8,319 ft., perf. 7,650-60 ft., IP: 71,000,000 cu. ft. gas, open flow, TP 2,978 psi.

TEXAS GULF COAST (DISTRICTS 2 AND 3) WILDCAT FAILURES

Bee County: S. Chamberlain 2 Mrs. Amos G. Welder, Thos. Quirk Sur., 1½ mi.

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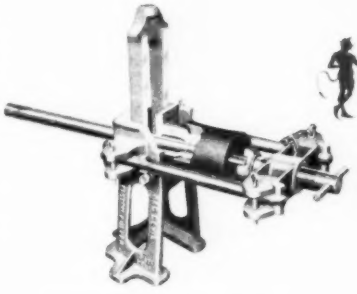

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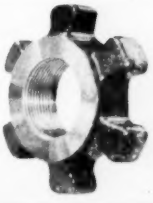

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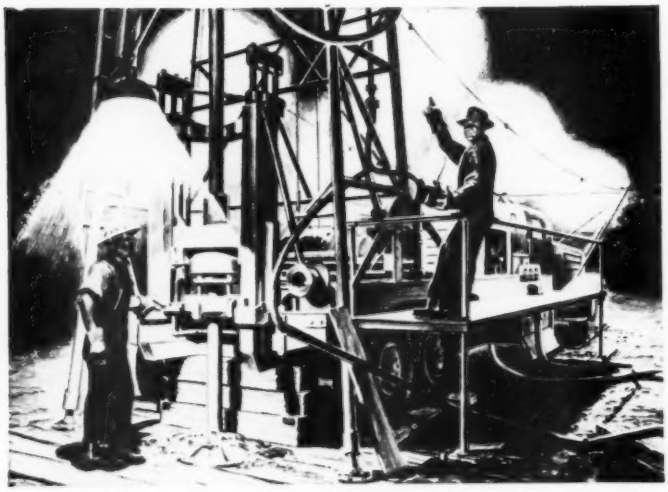

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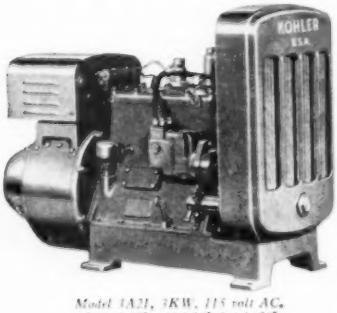

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W of Blanconia field, dry, TD 5,028 ft.

Jackson County: H. L. Hunt 1 H. W. Houston, V. Garcia 4-league Grant, A-24, 2 mi. N-NW of Vanderbilt, dry, TD 7,112 ft.

Live Oak County: Humphries and Hotchkin 1 James P. Murray, John Hefferman Sur. 2, A-11, 5 mi. N of Three Rivers, dry, TD 2,108 ft.

Walker County: L. M. York 1 Jake Bellinowski, New Waverly area, C. A. Sleight Sur., A-496, 2 mi. W of New Waverly, dry, TD 3,864 ft.

OKLAHOMA

Interest High in Area Near Ringwood Pool

WHILE no official information is available on the outpost tests of Ringwood pool in Major County, interest in the area continues as Mazda Oil Corp. stakes a new test for 1 Scannell, NE NE NE 3-21n-11w, about 2 miles west of the field. The Superior Oil Co. wildcats south and west of the pool, drilled as tight holes, are known to be at about test and local observers have reported the erection of two 250-bbl. tanks and the presence of a pumping unit at Superior 63-30 Fuller, NE SW NE 30-21n-10w, about 4 miles south and more than a mile west of nearest production in the field. Casing is reported to be moving to another Superior wildcat, 63-9 Coppock, NE SW NE 9-21n-11w, west of the field.

Flynn Oil Co. 1 Coker, SE SW SE 9-6n-3e, north offset to the recent Pottowatomie County discovery about 1½ miles north of West Archer pool, is showing for a good Layton sand producer. Layton was topped at 3,057 ft. and a drill-stem test at 3,053-83 ft. had gas in 7 minutes and a recovery of 2,250 ft. of oil and 150 ft. of oil and gas-cut mud at the end of the 2-hour test. Casing was set at 3,053 ft. Discovery well made 163 bbl. per day of 34°-gravity oil through ¼-in. choke.

The recently completed new-zone discovery for Southwest Lone Grove pool in Carter County, J. D. Lewis et al 1 Duke, SW NE NW 5-5s-1w, has had a good production increase after acid treatment. The well was completed in the lower Simpson for a flow of 70 bbl. through perforations at 4,636-88 ft. Pay was treated with 1,000 gal. of acid and was reported to have produced at the rate of 500 bbl. per day through tubing.

N. V. Duncan is getting a good Simpson well at the edge of North Webb pool in Grant County. The well, Duncan 2 Cornell, NE SE SE 13-28n-3w, is setting casing after two drill-stem tests had good oil flows. The first at 4,664-78 ft. flowed 50 bbl. per hour and the second at 4,678-84 ft. made 60 bbl. per hour through ½-in. choke.

OKLAHOMA SUCCESSFUL WILDCATS

Comanche County: Extension to Lawton—U. S. Government 1 Hollinshead, SW SW SW 23-2n-11w, pumped 2 bbl. of 33°-gravity oil per day from sand at 328-35 ft., TD 340 ft.

Lincoln County: Reopened Agra—Mohawk Drilling et al 1 Malloy, NW NW NW 30-17n-5e, pumped 25 bbl. of oil per day from dolomite at 4,188-4,212 ft., TD 4,250 ft.

Pottawatomie County: New pay in Maud—Vise et al 1 Owens, SE SW NE 24-8n-4e, pumped 2 bbl. of 38°-gravity oil per day from Viola at 4,252-69 ft., TD 4,515 ft.

OKLAHOMA WILDCAT FAILURES

Comanche County: Metzner 1 Moore, SW SW NE 35-1n-13w, dry, TD 1,845 ft., Arbuckle 1,680 ft.

Walter Silcott 1 Silcott, SW SW SE 17-2n-11w, dry, TD 390 ft.

Jefferson County: Sun 1 Harris, NE SE SE 17-6s-5w, dry, TD 2,840 ft., Hoxbar 1,200 ft., lime 2,460 ft., Arbuckle 2,730 ft.

Kiowa County: Van Boskirk et al 1 An-

derson, NE NW NE 34-2n-18w, dry, TD 1,611 ft. in sand.

Logan County: Lynn & Henry 1 Shipman, SW SW SW 3-16n-1w, dry, TD 5,705 ft., Hogshooter 4,218 ft., Layton 4,253 ft., Checkerboard 4,304 ft., oolitic 4,478 ft., conglomerate 4,510 ft. and 4,540 ft., Oswego 4,890 ft., Verdigris 5,100 ft., lime 5,157 ft., Mississippi lime 5,230 ft., Woodford 5,260 ft., Hunton 5,282 ft., Sylvan 5,360 ft., Viola 5,450 ft., dolomite 5,510 ft., Wilcox 5,610 ft., second Wilcox 5,690 ft.

Deep Well Drilling Co. 1 Stoner, SW SW NE 12-16n-4w, dry, TD 5,568 ft., Lovell lime 4,450 ft., Tonkawa sand 4,480 ft., Hominy Falls 5,285 ft., Hogshooter 5,364 ft., base Layton 5,540 ft.

Seminole County: Allen 1 Reed, SE SE SW 13-11n-7e, dry, TD 4,169 ft., Oswego 2,110 ft., Calvin 2,182 ft., second Calvin 2,224 ft., third Calvin 2,274 ft., fourth Calvin 2,340 ft., Earlsboro 2,975 ft., Inola 3,123 ft., Bartlesville 3,150 ft., lime 3,314 ft., Booch 3,426 ft., lower Booch 3,500 ft., Gilcrease 3,553 ft., sand 3,586 ft., Union Valley 3,626 ft., Cromwell 3,634 ft., second Cromwell 3,692 ft., Mayes 3,993 ft., Woodford 4,111 ft., Misener 4,144 ft., Hunton 4,146 ft.

Stephens County: Morgan 1 Manire, NW SE NE 2-2s-4w, dry, TD 7,493 ft.

Fleet 1 Stanley, SW SW SE 8-2s-6w, dry, TD 3,814 ft., Loco lime 2,080 ft.

Strother 1 Young, NW NW SW 15-3s-8w, dry, TD 3,506 ft.

N. CENTRAL TEXAS

Northcentral Young County Gets New Discovery

WICHITA FALLS.—Mid-Continent Petroleum Corp. and Panhandle Producing & Refining Co. 1 Leberman, Block 270, TE&L Survey, Young County Mississippian discovery 7 miles southwest of Jean, in the northcentral part of the county, drilled plug from casing set at 4,845 ft., washed in with water and kicked off to flow without swabbing. At the end of 10 hours it had made 214 bbl. of oil and was shut in for potential. Total depth was 4,854 ft. Location is on a block of 900 acres. British-American Oil Producing Co., Warren Oil Corp. and L. T. Burns hold close-in acreage. The new strike was expected to set off a drilling program.

The Ellenburger formation was to be tested by W. L. Hinds, Trustee, 1 Z. T. Wynn, in Block 115, T&P Survey, 2 miles west of Springtown in northeastern Parker County. A heavy-duty cable-tool rig, with capacity to 6,500 ft., was being moved to location.

At last report the 1 Wynn had total depth at 4,610 ft., in the Atoka conglomerate of the Pennsylvanian. Caddo lime was called by operators at 3,637 ft., and the first conglomerate at 4,145 ft. The Caddo lime, which has produced only gas in wildcats so far drilled in northeastern Parker County, was said to have had a good show of oil. Those wells, it was said, had gas-oil ratios too high to complete as oil producers.

Wise County exploration work included a new semiwildcat in the south-central section by Signal Oil & Gas Co. and Loffland Bros. as the 1 J. I. Gentry, Block 82, Matagorda County School Lands Survey, and on the north edge of Cottondale. The 6,000-ft. cable-tool test set surface casing at 560 ft. and was drilling ahead. Drill site is ½ mile south of Akin & Dimock 1 Gentry, in Block 83, which was in the completion stage as a gas producer from the Caddo.

Akin & Dimock 1 Willie Kinsey, Block 5, J. M. Mora Survey, 2½ miles west of Keeter, was drilling below 4,620 ft. in shale, and reported losing circulation. Signal and Lone Star Producing Co. 1 Lamance, wildcat 1 mile west of Keeter in Block 29, T&P Survey, was drilling below 3,320 ft. Nine miles southwest of Bridgeport, K. W. Kilpatrick 1 A. E. Albright, S. Evitts Survey, was last reported drilling below 2,000 ft.

Cities Service Oil Co. 1 S. Williamson, Block 4, Falls County School Lands Survey, prospective Simpson lime discovery 5 miles northwest of Alvord, swabbed 58½ bbl. of oil, plus some water, in 23 hours. Production was from perforations at 7,030-40 ft. It was to be swabbed out, reperforated and acidized.

In Foard County, Ard Drilling Co. 1 J. G. Halsell, confirmation test and west offset to the discovery of Halsell (Canyon) field, 8 miles south of Crowell, was drilling in shale and lime at 3,796 ft.

In Haskell County, J. C. Hunter, Jr., staked 1 E. Pardee, 900 ft. east and 600 ft. north of the northeast corner of Section 5, but in Section 6-5-H&TC. The proposed 5,000-ft. wildcat is 5 miles northeast of Stamford. At last report is was ready to spud in. In the northwestern part of the county, Danciger Oil & Refining Co. staked 10 C. L. Bogard 1,100 ft. from north and 380 ft. from east lines, Section 45, League 76, Wise County School Land Survey. Location is 1¼ miles south of Jud (Strawn sand) field, and 5 miles southwest of Rochester. Contract depth was 5,600 ft., which was expected to penetrate the Caddo.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) SUCCESSFUL WILDCATS

Wichita County: Bridwell Oil Co. 1 Roller Est., R. J. Scott Sur., A-256, 4 mi. S Iowa Park, S KMA area, N Holliday field, TD 2,951 ft., pay 2,948 ft., pumped 40.95 bbl. of 42°-gravity oil a day, GOR 200 cu. ft.

Wise County: Jones-Simpson Drilling Co. 1 T. H. Clifton, SA&MG Sur., A-787, 5 mi. SW Chico, TD 5,709 ft., elev. 944 ft., conglomerate pay 5,354 ft., 1,300,000 cu. ft. of gas a day, perf. 5,354-60 ft., top Caddo 4,995 ft.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) WILDCAT FAILURES

Archer County: Consolidated Oil Co. 1 R. L. Moody, SPRR Sur., Blk. 1, A-422, 1½ mi. W Holliday, dry, TD 1,883 ft.

Hanks and Gouchie 1 Nora Ordener, Lot 72, Blk. 3, Clark & Plumb Subd., 3 mi. NW Windthorst, dry, TD 4,705 ft.

G. T. Kimbell and C. J. Bohner 1 Mrs. J. Turbeville, Blk. 23, Jefferson CSL, 5 mi. E Anarene, dry, TD 3,654 ft., sand with odor 1,015-19 ft.

Brown County: J. O. Harris 1 R. D. Sanderson, Sec. 13, HT&B Sur., 7 mi. NW Brownwood, dry, TD 2,564 ft., elev. 1,596 ft., Ellenburger 2,547 ft.

G. F. Mulkey and R. P. Baldwin 1 Mary Chambers, James H. Brown Sur. 84, 2 mi. E Owens, dry, TD 2,852 ft., elev. 1,629 ft., Marble Falls 2,307 ft., Barnet shale 2,410 ft., Ellenburger 2,644 ft.

Cooke County: Russell Maguire 1 E. B. Hamilton, Chas. McCoy Sur., A-660, 2 mi. N Rosston, dry, TD 2,002 ft., no shows.

J. R. and Adam Seitz 1 H. E. Ramsey, B. Lusk Sur., A-569, 10 mi. N Muenster, dry, TD 1,951 ft., sandy shale 1,936-43 ft.

Hardeman County: Youngblood & Foree 1 R. D. L. Kellough, 16-H-Waco & Northwestern RR Sur., 7 mi. N Chillicothe, dry, TD 6,598 ft., Wolfe 2,605 ft., Breckenridge lime 3,366 ft., Gunsight 4,528 ft., Swastika sand 4,590 ft., Canyon 4,669 ft., Canyon lime 5,733 ft., Palo Pinto 5,964 ft., Strawn series 6,337 ft., gas at 6,058-79 ft. on DST.

Jack County: T. M. Weatherred 1 H. E. & R. L. Voyles, Sec. 1, SPRR Sur., A-580, 3 mi. S Antelope, dry, TD 582 ft.

Jones County: S. C. Herring Drilling Co. 1 L. A. Hudson, 66-1-BBB&C, 3 mi. NW Anson, dry, TD 3,925 ft., elev. 1,672 ft.

O. N. Sellars 1 F. T. Jackson, B. Travino Sur. 190, 4½ mi. E Hawley, dry, TD 2,297 ft., elev. 1,671 ft., Gunsight 2,156 ft., Tannehill 1,870 ft.

B. G. Sharpe and E. Autry 1 J. J. Steele, 11-15-T&P, 5 mi. N Hawley, dry, TD 2,500 ft., elev. 1,700 ft.

Knox County: Hewit & Dougherty 1 J. W. Zeissel, Lot 5, Blk. 12, D. G. Burnett

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Sur. A-17, 6 mi. NW Munday, dry, TD 6,116 ft., elev. 1,434 ft.

Palo Pinto County: G. E. Kadane & Sons 1 H. H. Johnson, Sec. 1, C. A. Dalton Sur., A-371, 5 mi. W Graford, dry, TD 1,858 ft., elev. 1,114 ft.

Shackelford County: Lundell Bros. 1 C. B. Snyder, Sec. 26, LAL Sur., 3 mi. SW Sedwick, dry, TD 628 ft.

Taylor County: Robinson-Puckett, Inc., 1 R. A. Cramer, 116-64-H&TC, 6½ mi. SE Shep, dry, TD 5,415 ft., elev. 2,072 ft., Noodle Creek 2,502 ft., Canyon reef 3,790 ft., Ellenburger 5,300 ft.

ROCKY MOUNTAIN

Phillips Misses Muddy, Completes in Dakota

DENVER.—Muddy sand was missing at the second well in the Glenrock area, Converse County, Wyoming, and Phillips Petroleum Co. completed the well flowing oil from the Dakota sand. The well is 1 Brubaker, SW SW SW 33-34n-75w, ¼ mile southeast of the Steelco Drilling Co. Muddy sand discovery. Phillips is now installing tank after the well flowed 115 bbl. of oil in 29 hours through ½-in. bottom-hole choke from Dakota sand between 7,048-7,086 ft. Cores in the Dakota showed 15 ft. of well saturated sand and 30 ft. of highly fractured shales with fair saturation. Steelco is now preparing to complete its 1 Robbins, SW SE SW 33-34n-75w, at 7,008 ft. after running casing to total depth. Top of the Dakota or Muddy has not been reported for the well. There are now five rigs running in this new field and recovery of oil in the Dakota at the Phillips test is expected to increase activity.

Wildcat activity in the northeastern part of Colorado has increased following shows of oil in the Muddy sand at the Adams Drilling Co.-J. M. Huber Corp. Fort Morgan wildcat, Morgan County. Huber has plugged back 1 Lee, C SW NE 2-2n-57w, and is now testing with the well making water with some oil. The operator feels that the water is probably from the Dakota and will recement prior to further testing in the Muddy. British-American Oil Producing Co. is rigging up rotary on its 1 Siegelke, NE NW NE 26-11n-53w, a wildcat in the Armstrong area, Logan County. This well is on a 62,000-acre block acquired by Plains Exploration Co. of Denver and others and farmed out by British-American following seismic work. Plains drilled two dry holes on this block in the past 2 years. In the Woodrow area, Washington County, Adams Drilling Co. et al are moving in materials for 1 State, C SW NE 16-1s-55w, another Dakota sand test in this region. Leasing in northeastern Colorado has continued at an active pace with The Texas Co., Stanolind Oil & Gas Co., Alladin Oil Co., Skelly Oil Co. and others reportedly acquiring lands.

There is considerable interest in the wildcat now being drilled by the California Co. at its Gusher Unit, SE NW NW 35-5s-19e, Uintah County, Utah. The well is now below 8,443 ft. with no report by the operator of formation tops or tests. Its objective is Basal Green River productive in the Carter Oil Co.-Stanolind Oil & Gas Co. discovery well at Roosevelt. California's block at Gusher adjoins to the east the Roosevelt producer. Carter and Stanolind are expected shortly to announce location for a second well in the Roosevelt area with the well to be located ½ mile east of their discovery. Land activities in this section of the Uintah Basin have increased in recent months and several wildcats are expected to be drilled as a result of exploratory work during the past 6 months.

New locations.—There were 13 new locations during the week with 7 in Wyoming, 3 in western Nebraska, 2 in northern New Mexico and 1 in Montana. In western Nebraska the Ohio Oil Co. announced location for a wildcat 2 miles east of Cruise at 1 McLeron, NE NE NE 9-14n-49w, in the Sunol area. It is reported that this well may be drilled to granite but this is not confirmed by Ohio. A heavier rig than those used on previous wells is reportedly moving in for the new test. Other locations were for pool operations.

WILDCAT FAILURE IN MONTANA

Chimney Butte, Musselshell County: Texas Pacific Coal & Oil Co. 1 SE, NW NE 11-7n-27e; 9,047 TD; abnd.; Lennep 1,602, Bearpaw 2,150, Judith River 3,224, Claggett 3,500, Eagle 3,935, Colorado 4,260, Frontier 5,490, first Cat Creek 6,228, Kootenai 6,340, Morrison 6,555, Ellis 6,790, Amsden 7,138, Charles (?) 7,350, Madison 7,967, Devonian (?) 8,580, Ordovician 8,812, Cambrian 8,935.

GAS DISCOVERY IN NEBRASKA

Huntsman area, Cheyenne County: Ohio Oil Co. 1 Cruise, NW SW SE 7-14n-49w; 5,195 TD; flowed 54,000 MCF gas per day; Niobrara 3,852, Fort Hayes 4,102, Codell 4,208, Greenhorn 4,350, first Dakota 4,618, second Dakota 4,681, third Dakota 3,742, first Lakota 4,960, second Lakota 4,998, third Lakota 5,056, fourth Lakota 5,120, Morrison 5,180.

WILDCAT FAILURES IN NEBRASKA

Oshkosh area, Garden County: B. B. Carter 1 Quelle, SE SE SE 6-17n-44w; 3,421 TD; abnd.; Niobrara 2,465, Dakota 3,202, Greenhorn 2,995, Fuson 3,420.

Gering area, Scottsbluff County: Lowell-Gist, Inc., 1 Weber-Hampton, SE SE NW 5.21n-54w; 4,843 TD; abnd.; Niobrara 3,723, Frontier 4,072 (?), Greenhorn 4,252, Newcastle (Muddy) 4,732, sand 4,743-80.

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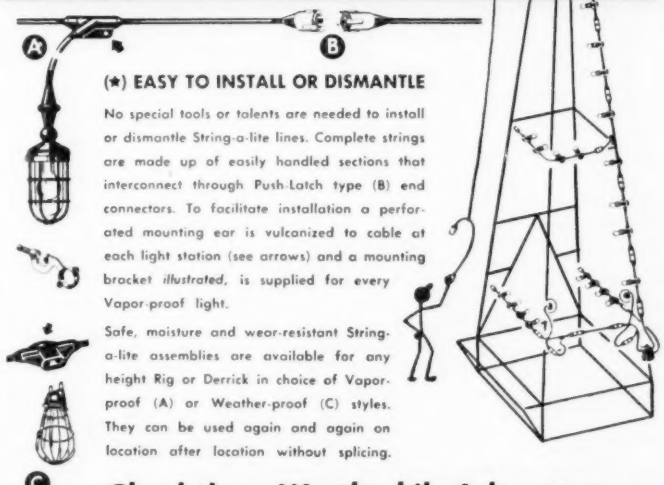

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EASTERN TEXAS

Humble Finds no Shows In Nacogdoches Wildcat

DALLAS—Humble Oil & Refining Co. 1 Mrs. Ruth Frank et al, Jefferson Wilson Survey, A-59, Nacogdoches wildcat 3½ miles southeast of Douglas, had total depth at 9,194 ft., in limestone and was reaming. Operators cored black shale with no shows from 9,069-94 ft., and lime and shale from 9,094-9,144 ft.

Sun Oil Co. 1 Hartless, M. J. Sanchez Survey, A-504, new Woodbine wildcat 1 mile north and slightly west of Lilbert, was drilling below 4,525 ft. It had the Nacatoch from 3,690-3,720 ft., and Pecan Gap at 3,870-3,900 ft., by samples.

In the Red Springs area of Smith County, Humble 1 Harry S. Chambers, George W. Welch Survey, A-1,079, set 7-in. casing at 9,730 ft. with 220 sacks and was waiting on cement. Total depth was 9,764 ft. After running electrical surveys to 9,764 ft., a 65-minute drill-stem test of the Rodessa at 9,720-64 ft., using ¼-in. bottom and 1-in. top chokes, and 3,760 ft. of water cushion, recovered the water cushion cut with gas, plus 210 ft. of gas-cut mud. Bottom-hole flowing pressure was 1,762 psi., and 4,655 psi. shut in.

Bobby Manziel 1 John L. Campbell, Robert Fletcher Survey, A-359, 3½ miles south of Tyler in Smith County, stopped at 7,734 ft. in sandy shale to change bits. Side-wall cores were taken from 5,032, 5,037, 5,038, 5,040, 5,044, and 5,047 ft., all of which recovered soft water-white sand with no shows.

EAST TEXAS (DISTRICTS 5, 6 AND 6-P) WILDCAT FAILURES

Anderson County: Delta Drilling Co. 1 Minnie Russell, on 163-acre tract, I&GN RR Sur., 1 mi. S Blackfoot, dry, TD 10,260 ft., elev. 376 ft., base Austin 4,500-10 ft., Comanche 5,960-90 ft., Kiamichi 6,980-90 ft., Goodland 7,050-60 ft., upper Glen Rose 7,650-60 ft., Massive 8,930-40 to 9,530-35 ft.

L. A. Douglas and F. Kirk Johnson 1 J. W. Braley, on 75-acre tract, John Little Sur., 10½ mi. N Palestine, dry, TD 5,416 ft., Nacatoch 3,055 ft., Pecan 3,656 ft., Austin 4,682-4,970 ft., Woodbine 5,230 ft.

Denton County: Seneca Oil Co. 1 W. E. Fortenberry, Chas. DeMorse Sur., A-334, 7 mi. NW Sanger, dry, TD 2,074 ft., elev. 720 ft.

Grayson County: J. L. Anderson 1 J. M. Swindle, Charles Quillen Sur., A-989, ½ mi. S Collinsville, dry, TD 4,075 ft., show of oil and salt water 3,970-81 ft.

Quentin Little 1 Gus Richardson, Jas. Pearson Sur., A-849, 3 mi. NE Sherman, dry, TD 5,500 ft., elev. 624 ft.

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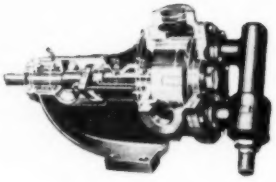

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MICHIGAN

Flowing Dundee Well Is Completed in Michigan

MOUNT PLEASANT—The first exciting news of a potential new Dundee oil strike in Michigan came this week as Kenneth A. Fox logged a flowing oil pay in this horizon at his 1 Gee, SE SW NE 15-12n-13w, White River Township, Muskegon County.

Wildcat topped Dundee objective at about 2,048 ft. and carried oil pay from 2,053-56 ft. Hole filled to flow point in 3 hours and made one flow over the drilling machine before bailer could be removed from the hole and control gate closed.

On an 8-hour flow test the well flowed about 100 bbl. of oil through the casing and with the gate valve pinched back. After this period well was shut in for tank room.

The new Muskegon strike is located about 5 miles south of Carter Oil Co.'s Stony Lake Traverse pool in Oceana County and is on the extreme western edge of the Michigan Basin, less than a mile inland from the Lake Michigan shoreline.

This is the second wildcat drilled by Fox and associates in the township and the first to be deepened by him into the Dundee. It appeared to be the second well to penetrate a zone below the Traverse in the township.

Wildcat was drilled as a play supported by Ohio Oil Co., but when plans were arranged to deepen from the Traverse to the lower zones, Ohio farmed its block to Fox with an override rather than contribute money for the deepening. Fox and associates control about 3,000 acres of leases around the new strike.

Those interested with Kenneth Fox with major working interests in the play include Muskegon Development Co., drilling contractors, and Norman Trexler, Ithaca, Mich., independent operator.

On the basis of preliminary reports and the strength of the well itself, it appeared to be the first major discovery for the state this year.

MICHIGAN SUCCESSFUL WILDCAT

Muskegon County, Cedar Creek Township: Mercer Oil Co., Inc., 1 Knitter, SW SW SE 23-11n-15w, Traverse 1,948 ft., 20 bbl. oil and 80 water after 100 and 500 gal. acid, TD 2,449 ft., PB to 1,958 ft. (Dry in Dundee and Monroe).

MICHIGAN WILDCAT FAILURES

Allegan County, Casco Township: Norman L. Stevens 1 Fleming, SW NE SW 9-1n-16w, Traverse 1,133 ft., dry, TD 1,138 ft.

Casco Township: Pascal F. Broughton 1 Johnson, NE SW SW 15-1n-16w, Traverse 1,153 ft., dry, TD 1,164 ft.

Heath Township: R. T. Jones A-1 U. S. Govt., NW SW NE 25-3n-14w, Traverse 1,465 ft., dry, TD 1,500 ft.

Arenac County, Mason Township: Whute, Whyte & Roush 1 Gettel, SE SW SW 20-20n-5e, Dundee 2,749 ft., dry, TD 3,065 ft.

Isabella County, Fremont Township: Edward H. Breidenstein 1 Curtis, NW SW NE 9-13n-5w, Dundee 3,613 ft., dry, TD 3,644 ft.

Mecosta County, Colfax Township: Jessie W. Matteson, Trustee 1 Jeft, SW SW NW 22-15n-9w, dry in Richfield, TD 4,716 ft.

Muskegon County, Fruitland Township: Mercer Oil Co., Inc. 1 Barrow, NW NE NW 16-11n-17w, Monroe 2,219 ft., dry, TD 2,289 ft.

Roscommon County, Roscommon Township: Eugene Hilliard D-9 State-Roscommon, SE SE NE 20-21n-3w, Dundee 3,959 ft., dry, TD 4,122 ft.

Saginaw County, Birch Run Township: Dundee Oil & Gas Co. 1 Worden, SE NE NW 19-10n-6e, Dundee 2,520 ft., dry, TD 2,716 ft.

LA.-ARK.

Barnsdall, Pan American Coring After Oil Shows

SHREVEPORT.—Barnsdall Oil Co. and Pan American Production Co. 1 A. G. Worley, 5-22n-8w, 2 miles east of the Cykesville field in Claiborne Parish, reported oil shows in the lower Glen Rose. A core from 5,645-78 ft. recovered 10 ft. of shale, 9 ft. of oolitic lime having a good show of oil, of which the bottom 3 ft. had bleeding oil, and 1 ft. of shale. Operators continued coring below 5,678 ft.

Gulf Refining Co. 1 Kinnebrew, 26-20n-7w, was waiting on cement after plugging back from 11,513 ft. to 8,450 ft., in the Smackover.

C. H. Murphy, Jr., 2 Barnett "Unit B-3," Bodcaw test in the Hico-Knowles field, attempted a drill-stem test from 8,511-18 ft., using ¼-in. chokes and 2,500 ft. of water cushion. The tool was open 5 minutes when packer failed, and recovery was 150 ft. of slightly gas-cut mud. Operators ran electrical surveys, set 5½-in. casing at 8,569 ft. and were waiting on cement.

On elevation of 126 ft., the 2 Barnett well logged the Cotton Valley at 7,810 ft., the Bodcaw section at 8,384-8,464 ft., and the Vaughn from 8,509-21 ft. Location is 200 ft. southwest of the center of the southwest quarter, 19-20n-3w.

In Lincoln Parish, Southwest Natural Producing Co. 1 Colvin, 31-20n-2w, logged the Cotton Valley black shale at 8,132 ft., elevation 167 ft., and was drilling below 8,360 ft.

V. V. Bull 2 Fred Huenefeld, SW NW SW 29-18n-5e, Ouachita Parish, was drilling at 3,175 ft. in the lower Glen Rose following a drill-stem test in gas rock at 2,249-66 ft. After 45 minutes, recovery was 60 ft. of gas-cut mud and salt water.

British-American Oil Producing Co. 1 Sheppard, 15-19s-17w, Union County, Arkansas, was drilling below 7,127 ft. A core from 6,631-41 ft. recovered 10 ft., being 8 in. of silty sand, 7 ft. of hard non-porous sand and the balance black shale.

NORTH LOUISIANA WILDCAT FAILURE

Caldwell Parish: Caddo Oil Co. 1 T. H. Martin, 38-13n-4e, dry, TD 1,397 ft., elev. 68 ft., no shows.

ARKANSAS WILDCAT FAILURE

Union County: Spartan Drilling Co. 1 Sallie Irby, NE SE 22-18s-17w, dry, TD 7,885 ft., elev. 286 ft., Jones sand 7,668 ft., Smackover 7,755 ft., porosity 7,790 ft.

CANADIAN FIELDS

Royalite Potential Discovery To Test Madison Porosity

CALGARY.—Royalite Oil Co., Ltd., got Madison lime oil encouragement at the Pekisko Hills wildcat located on a Socony-Vacuum Exploration Co. farmout in the foothills about 48 miles southwest of Calgary. Royalite has set casing preliminary to acidizing and testing the formation.

The well, Royalite-Socony-Pekisko 1, LSD 11, 31-16-2w5, was drilled to 2,830 ft. after showing some porosity, fracturing, and oil staining in the upper porous zone of the Madison. A string of 6⅞-in. and 7-in. casing was set at 1,835 ft. using 575 sacks. The lime was topped at 1,812 ft.

Canadian Gulf Oil Co. is assured of production at its fourth Stettler well, in the Devonian pool 100 miles northeast of Calgary discovered by the company last spring. Gulf has also staked a new location in the field, offsetting British Empire Oil Development's D2 well 2½ miles north of Gulf's group of producers. The new well will raise Gulf's working rigs in the area. At present five rigs are working, three on offset development drilling and two on wildcats. The new location, Gulf-CPR-Shinness 16, LSD 16, 21-38-20w4, ⅜ mile southwest of British Empire 1 D2 oil well, will start shortly.

The new success is Gulf-CPR-Havig 1, LSD 1, 9-38-20w4, ½ mile west of the discovery well, Gulf-Ellis 4. The Havig 1 penentrated over 40 ft. of oil-bearing D2 zone and has reached D3 zone at an elevation assuring around 40 ft. of oil section above the water line. It will be completed as a D3 well. The well is currently bottomed at 5,341 ft. and casing off the D2.

Lea Park Oils, Ltd., Regina firm backed by Saskatchewan people, plans to drill a deep Devonian test in the Lea Park area of east central Alberta. The project involves an Alberta Crown exploration reservation on 59,950 acres, in Township 53, Range 3w4, and Township 55, Ranges 2 and 3w4, around 30 miles north-northwest of Lloydminster. The new venture will follow a sizeable program of exploration carried out during 1949 on the reservation by H. R. Larson and J. A. Piggott of Saskatoon, J. C. Boyle of Regina and associates. Last year 15 shallow holes and 2 relatively deep tests to the top of the Devonian were drilled. A large structure was outlined, and the two deeper tests, Lea Park 1 and 2, showed the presence of oil sands similar to those of the Lloydminster area. The structural conditions show that the oil sands may prove to be widespread; this is also indicated by the fact that the two deeper wells are more than 4 miles apart.

Hudson's Bay Oil & Gas Co. and Sparky Oils, Ltd., have staked location and are moving in drilling equipment for another well in the Oyen area of southeast Alberta.

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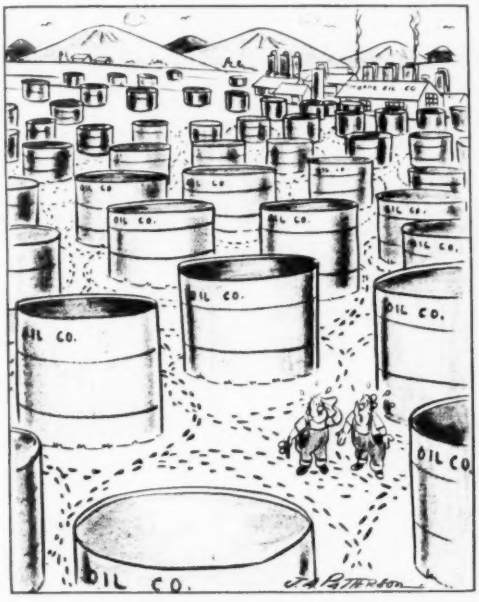

THE OIL AND GAS JOURNAL

"It's no use, Gus, we're lost—we been goin' in circles!"

The purpose of the well is to determine the extent of the natural gas reserve discovered by the team's first well, 5½ miles to the northwest.

The new well, Hudson's Bay-Sparky 2, LSD 2, 27-28-4w4, is about 156 miles east-northeast of Calgary and 4 miles due north of Oyen. It will be a test of the Bow Island sand, down to a probable completion depth of 2,650 ft. The discovery well, Hudson's Bay-Sparky 1, LSD 4, 12-29-5w4, rated a natural gas flow of 6,800,000 cu. ft. daily from the Bow Island sand at 2,588-2,613 ft. It has been capped pending a market.

Seventeen wells completed drilling in Alberta this week, including 10 oil wells with combined open flow potential of 11,317 bbl. daily. Eight at Redwater flushed at a combined rate of 10,484 bbl. daily, one at Woodbend showed 396 bbl., and one at Turner Valley rated 437 bbl. Six completions, one at Redwater and five wildcats, were failures. One well, at Waybrook, was a natural gas discovery in the Cretaceous but completed in water-bearing Devonian coral reef to permit long-term studies of water relationships with the nearby Redwater field.

SUCCESSFUL WILDCAT

Imperial-Waybrook 1, LSD 4, 32-57-24w4, TD 4,085 ft., potential gas well, water survey well.

WILDCAT FAILURES

Imperial-Eyehill 1, LSD 13, 36-35-2w4, TD 7,231 ft.

Rio Bravo-Bird 15-20, LSD 15, 20-37-15w4, TD 4,615 ft.

B-H-S-Pelican Lake 1, LSD 1, 27-79-22w4, TD 3,200 ft.

B-H-S-Wabiskaw 1, LSD 11, 17-78-2w5, TD 5,769 ft.

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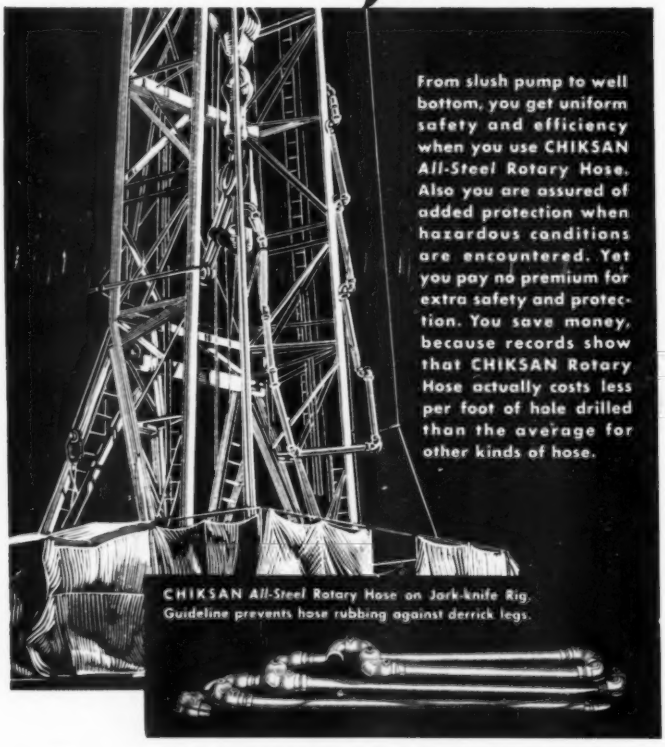

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PERMIAN BASIN

Progress Stakes Offset To Recent Reef Strike

MIDLAND—Progress Petroleum Co. staked location for a north offset to the 1 O. R. Buffaloe, reef discovery north of the North Snyder main field in Section 565. The new well is the 2 Buffaloe, located 467 ft. from north and east lines, southeast quarter of the same section. Projected depth was 7,500 ft., if necessary.

The 1 Buffaloe, which had flowed oil at an estimated rate of 15 bbl. an hour on a drill-stem test in the top of the Canyon reef at 6,787-6,802 ft. was drilled to 6,900 ft. The section from 6,802-6,900 ft. was not tested, but samples indicated additional pay, it was said. Operators set 5½-in. casing at 6,783 ft., drilled plug out to 6,798 ft. and prepared to test the bottom 15-ft. section.

At last report, Castleman & O'Neill 1 Feldman-Pardo, 651-97-H&TC, had reached 6,626 ft. and was drilling in shale. Location is about 2 miles north and east of the 1 Buffaloe, and on a line between that discovery and Cogdell (Canyon) field.

Completion report was in this week at Chapman & McFarlin (formerly J. A. Chapman Production Co.), 3 D. M. Cogdell, ½-mile north offset and extension to the Cogdell discovery, in 716-97-H&TC. Initial potential was 985.68 bbl. of 41.9°-gravity oil a day through ½-in. choke. Gas-oil ratio was 560 cu. ft., with pressures of 270 psi. on tubing and 350 psi. on casing. Top of the reef was minus 4,341 ft.

In northeastern Scurry County, M. E. Davis 1-A John J. Schattel, 90-2-H&TC, Ellenburger wildcat which had been trying to make a commercial completion, was plugging to abandon. At 7,765 ft., plugged-back total depth, it pumped 5½ bbl. of oil in 24 hours.

Gene Goff 1 Joe Rylander, 124-3-H&GN, 1 mile east of Snyder and 2 miles east of Kelley field production, completed as a Strawn discovery, pumping 206 bbl. of 45°-gravity oil a day. Top of pay was 7,147 ft. on elevation of 2,404 ft., drilled to 7,197 ft. Location is 5½ miles south of Sunray's 1 Senfell, Strawn discovery.

Borden County.—Seaboard Oil Co. 1 Porter Hanks, 19-32-T3N-T&P, discovery 2 miles northwest of Vealmoor field, had total depth at 8,200 ft., ran tubing and prepared to swab in for completion potential. An earlier test flowed 112.72 bbl. of oil in 8 hours, with gas-oil ratio of 695 cu. ft., under tubing pressure of 490 psi. Casing had been perforated with 4 shots per foot from 8,175-8,200 ft.

Barnsdall Oil Co. 1 W. L. Wilson, 16-27-H&TC, 2 miles west of Standard of Texas 1-6 Griffin, recovered 5,390 ft. of drilling mud on a 1-hour drill-stem test at 5,490-5,570 ft. It lost circulation in the last 10 ft. of hole.

Honolulu Oil Corp. 1 T. J. Good, 2-32-T3N-T&P, wildcat 4 miles northeast of the Vealmoor field, was drilling ahead below 9,250 ft. in lime.

Upton County.—Sharples Oil Corp. 1-E-43 TXL, Ellenburger test on the southeast side of the Pegasus multiple-pay field, and ½ mile west of the nearest producer, was drilling below 10,565 ft. in the Pennsylvanian. A drill-stem test from 10,460-10,565 ft. ended in 35 minutes due to mechanical difficulties, produced a good blow of air at the start and had gas in 19 minutes. Maximum gas volume was estimated at 72,000 cu. ft. per day. Recovery was 25 ft. of free, 42°-gravity oil and 1,000 ft. of heavily oil and gas-cut drilling mud. Top of the Pennsylvanian was 10,270 ft., or minus 7,395 ft., which was 22 ft. high to Republic Natural Gas Co. 1 Powell, Ellenburger producer ½ mile to the east. Location of the Sharples well is NW NE 43-40-T4S-T&P.

Midland County.—General American Oil Co. 1 Hal C. Peck, 21-41-T4S-T&P, Ellenburger discovery or extension about 4 miles west of Pegasus field, was flowing and test-

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ing after acidizing with 1,000 gal. of mud acid. Total depth was 13,399 ft., plugged back to 13,338 ft. Perforations were 4 per foot from 13,128-250 ft.

With 2-in. tubing set at 13,306 ft. it was swabbed twice, then kicked off to flow 483 bbl. of fluid in 11 hours through 1-in. opening. Breakdown on the fluid produced was not reported. Testing continued, during which it flowed 132.5 bbl. of fluid cutting 25 per cent acid and wash water for 1 hour and 45 minutes; then for four 1-hour periods it gaged 93.5 bbl., cut 8 per cent with acid and wash water, 60.5 bbl. cut 7 per cent with water, 76 bbl. of oil with a slight cut, and 75 bbl. of oil with slight cut. The last hour it flowed 45 bbl. of oil. All tests were through 1-in. choke. Gulf Oil Corp. was reported taking the oil.

Sinclair Oil & Gas Co. 1 June T. Sanders, 16-41-T&P, north offset to General American's well, was rigging up. Lewis T. Lohman 1 Josie Faye Peck, NE NE Section 29, west offset to the discovery, was drilling below 350 ft. at last report. It was scheduled to 13,300 ft. Trebol Oil Co. and others 1-E Josie Faye Peck, 1 location farther west from Lohman 1 Peck, had spudded in and was drilling at last report.

WEST TEXAS (DISTRICTS 8 AND 7-C) SUCCESSFUL WILDCAT

Ector County: Eastland Oil Co. 1 J. Lee Johnson, Jr., NW SW 37-44-T1S-T&P, 2 mi. SE Goldsmith field, 701 ft. SW 1-S Johnson (correction on footage, reported last week as San Andres discovery, and north offset to Shell 1 Johnson, dry hole), TD 5,800 ft., elev. 3,082 ft., PB 5,492 ft., San Andres 4,300 ft., San Angelo 5,260 ft., perfs. 5,280-5,350 ft. and 5,375-90 ft., open hole 5,450-92 ft., pumped 65½ bbl. of 30°-gravity oil a day.

WEST TEXAS (DISTRICTS 8 AND 7-C) WILDCAT FAILURES

Brewster County: Pepper & Heard 1 Earl McElroy, 1-364-Andred Sargeant Sur., 50 mi. S Alpine, dry, TD 2,470 ft. in black shale, elev. 3,700 ft., top black lime 2,228 ft.

Coke County: Providence Oil Co. 1 S. E. Adams, G. Bluthart Sur. 471, 5 mi. NW Wendland field, 2 mi. S Robert Lee, dry, TD 6,392 ft., Strawn 5,360 ft., Ellenburger 6,360 ft.

Crockett County: Cummins-Berger & Smith 1-B Shannon Estate, 17-UV-GC&SF, 13 mi. NW Ozona, dry, TD 1,562 ft., elev. 2,653 ft.

Crosby County: Rogers Bros. & Stewart 1 E. M. Wahlenmaier, 3-D15-WTRR, 20 mi. N Post, dry, TD 2,930 ft., elev. 2,552 ft., Wichita lime 2,035 ft., pumped 15 bbl. oil and 15 bbl. salt water from 2,846 ft., water increased and oil decreased to 3-4 bbl. daily.

Culberson County: Gulf Oil Corp. 1 M. A. Grisham, 18-99-PSL, 30 mi. N Van Horn, dry, TD 6,000 ft., elev. 5,695 ft., Simpson 5,585 ft., Ellenburger 5,810 ft.

King County: Ard Drilling Co. 1 R. B. Masterson, Sec. 51, F. P. Knott Sur., 15 mi. NE Guthrie, dry, TD 4,439 ft., Ivan lime 3,430 ft., reef lime 4,409 ft.

McCullough County: J. L. Slusher 1 J. L. Cox, Bottmer Sur. 1292, 5 mi. E Stacy, dry, TD 1,605 ft., Ellenburger 1,600 ft.

Mitchell County: S. F. Hurlburt and Olson Drilling Co. 1-A U. D. Wulfjen, 89-26-T&P, 7 mi. S Colorado City, dry, TD 7,857 ft., elev. 2,131 ft., San Andres 1,120 ft., San Angelo 1,630 ft., Clear Fork 1,900 ft., Ellenburger 7,488 ft.

Motley County: Humble Oil & Refining Co. 2-H Matador Land & Cattle Co., 131-M-Matador Land & Cattle Co. Sur., 16 mi. E Matador, 2 mi. S 1-H well, dry, TD 7,882 ft., elev. 1,964 ft., Wolfcamp 2,945 ft., Cisco 4,010 ft., Strawn 6,100 ft., Mississippian 7,200 ft., pre-Cambrian 7,872 ft.

Pecos County: Ted Weiner et al 1 Sullivan Estate, 70-10-H&GN, 10 mi. S Imperial, dry, TD 1,795 ft., elev. 2,451 ft., Yates 1,090 ft.

Sterling County: Duncan Drilling Co. 1 Mable Johnston, 80-5-H&TC, 8 mi. W Water Valley, 1 mi. S Clark field, dry, TD 1,284 ft., elev. 2,332 ft., San Andres 990 ft.

Upton County: Fred Turner 1 Neal (formerly Richardson & Bass 1 Neal), SE NW 8-Y-GC&SF, ½ mi. E 1 Neal discovery, dry, TD 11,936 ft., elev. 2,710 ft., PB 11,925 ft., Yates 2,320 ft., Devonian 11,265 ft., Fusselman 11,861 ft., Montoya 11,934 ft.

Ward County: Gulf Oil Corp. 9-E Wristen Bros. (formerly 9-SI), 24-B28-PSL, 2 mi. E Shipley Silurian field, dry, TD 8,939 ft., elev. 2,494 ft., Devonian 6,161 ft., Fusselman 6,600 ft.

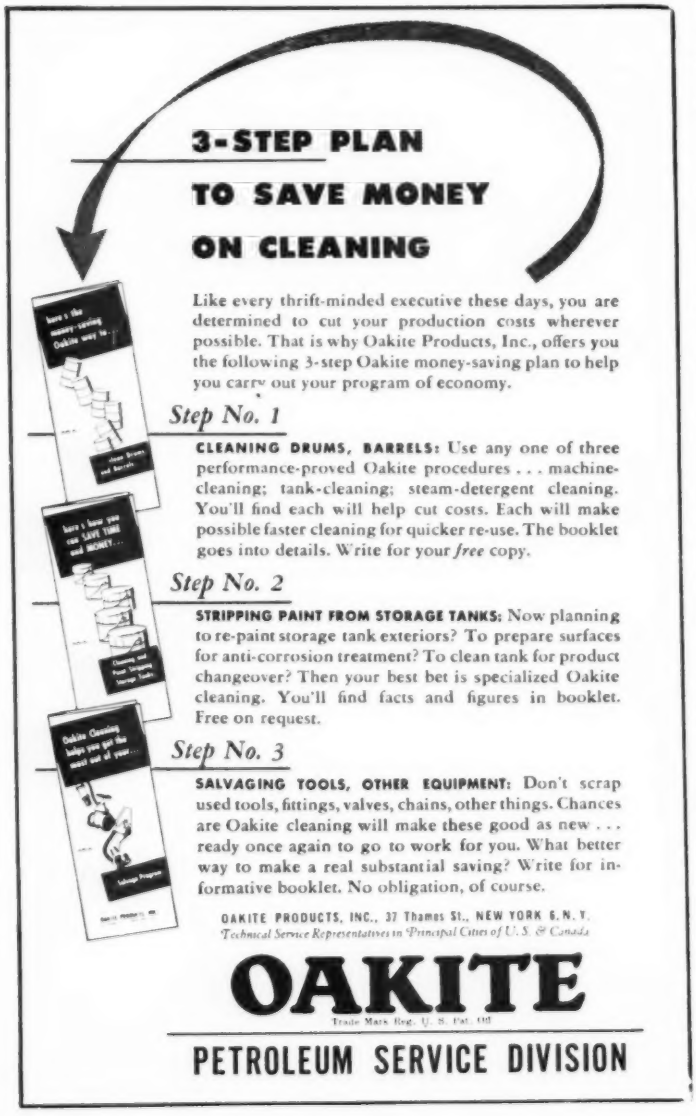
SOUTHEASTERN NEW MEXICO

HOBBS—Gulf Oil Corp. 11 LaMunyon, NE NW 27-23s-37e, on the east side of the Teague field of Lea County, and 5 miles west of the Texas line, established a new pay in the Ellenburger. Completion was without acid, from 200 perforations from 9,700-50 ft., where it flowed 396 bbl. of 45°-gravity oil a day, based on a 10-hour test, through ¾-in. choke. Gas-oil ratio was 980 cu. ft., and flowing pressures were 75 psi. on tubing and 960 psi. on casing. On elevation of 3,292 ft., it had top of the Ellenburger at 9,707 ft. Regular pay for the field is the McKee sand, which the 11 LaMunyon topped at 9,235 ft.

A drill-stem test in the McKee, open 2 hours from 9,229-9,314 ft., had gas in 25 minutes and recovered 150 ft. of clean oil, plus 180 ft. of heavily oil-cut mud. A second test from 9,225-9,421 ft., open 2 hours, recovered about 4,000 ft. of 40.5°-gravity oil and 4,700 ft. of oil-cut mud.

Atlantic Refining Co. 1-B Dickinson, NW SW 12-15s-37e, completed as a northeast extension to Denton field and new pay discovery in the Wolfcamp. Total depth was 9,420 ft. and initial potential was 177 bbl. of 40°-gravity oil, through 20/64-in. choke on tubing. Gas-oil ratio was 216 cu. ft.

Gulf Oil Corp. 1 L. R. Chamberlain, NW NE 14-15s-37e, 13 miles northeast of Lovington, started flow tests after setting 7-in.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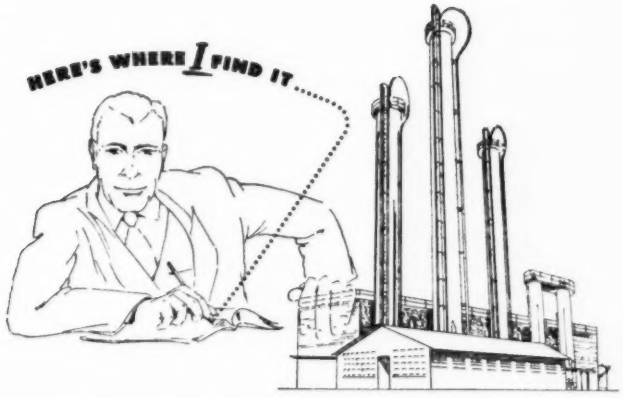

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casing at 11,501 ft. with 525 sacks. First 20-hour test, through 10 64-in. choke, produced 388 bbl. of 43.6°-gravity oil. Corrected top on the Devonian was 11,497 ft., on elevation of 3,797 ft.

Shell Oil Co. 1 W. V. Lawrence, deep test 6 miles northeast of the Hobbs field, in SE SW 32-17s-39e, was drilling limestone below 13,446 ft. Additional tops released were: Pennsylvanian 10,500 ft., Mississippian 11,020 ft., Woodford shale 11,770 ft., Silurian 12,820 ft., and Montoya 13,285 ft. Elevation is 3,645 ft.

SOUTHEAST NEW MEXICO SUCCESSFUL WILDCAT

Lea County: Plains Production Co. 1 Scarborough-Shell, SE NW 24-26s-37e, 2 mi. E Rhodes field, TD 3,440 ft., elev. 2,992 ft., top Queen pay 3,438 ft., flowed 330 bbl. of 40°-gravity oil a day, open 2-in., open hole 3,250-3,440 ft.

SOUTH LOUISIANA

Atlantic Is Completing Gas-Condensate Discovery

NEW ORLEANS.—Atlantic Refining Co. is in the process of completing a gas-condensate discovery 1½ miles from the old Midland prospect, 18-10s-1w, Acadia Parish. The well, 1 Pearl R. Cowen, was tested for a flow of 36 bbl. of 50.8°-gravity condensate plus 2,220,000 cu. ft. of gas daily through a 10 64-in. choke. Perforations were made for the test at 10,870-80 ft. and 10,829-97 ft., after previous tests showed salt water and a little gas. Operators will complete the well at 10,870-80 ft., and are now waiting on state potential.

A second gasser in the Maxie area of Acadia Parish has been finaled at the Hassie Hunt Trust 1 H. L. Keane, ½ mile north of the 1 Robison discovery well. Hole is bottomed at 10,772 ft. and has 5½-in. oil string cemented at 10,755 ft. The well was gaged for 47 bbl. of distillate and 1,400,000 cu. ft. of gas daily through 11/64-in. choke. Production is through perforations at 10,679-82 ft. Distillate tested 52° gravity and flowing pressure on the tubing was 4,100 psi.

Sohio Oil Co. is completing the 1-B M. O. Miller, 12-15s-5w, Calcasieu Parish, for a gas-distillate discovery in the Grand Cheniere area. It is reported that a 12-ft. gas-distillate sand has been proven at a depth of 8,100 ft., which is considered the upper sand. Lower sand is reported to be topped around 8,400 ft., and altogether operator is supposed to have approximately 74 ft. of effective sand. Well is now bottomed at 8,500 ft., and operator is currently coring below 8,400 ft.

Ohio Oil Co. continues to drill ahead below 9,872 ft. in the 1 E. W. Brown, Jr., wildcat test approximately ¼ mile east of Orange, Tex., Calcasieu Parish. The well tested 39°-gravity oil on a drill-stem test at 7,986-97 ft. However, operator plans to drill to approximately 10,000 ft. in search of better shows.

The 21 new locations include 3 wildcat starts, 1 each in Iberia, Pointe Coupee, and St. James parishes. There was one successful exploratory test completed in Jefferson Parish, while one was reported dry in Plaquemines Parish.

SOUTH LOUISIANA SUCCESSFUL WILDCAT

Jefferson Parish: Oil discovery—The California Co. 17 Fleming Plantation, 1-16s-23e, top pay 8,452 ft., TD 10,395 ft., perf. 8,452-62 ft., IP: 195 bbl. oil per day, 8 64-in. choke, TP 1,365 psi., 37.1° gravity, GOR 1,228.

SOUTH LOUISIANA WILDCAT FAILURE

Plaquemines Parish: William Helis 1 Louisiana Citrus Lands, Inc., 6-17s-25e, 2 mi. S of Myrtle Grove, dry, TD 11,665

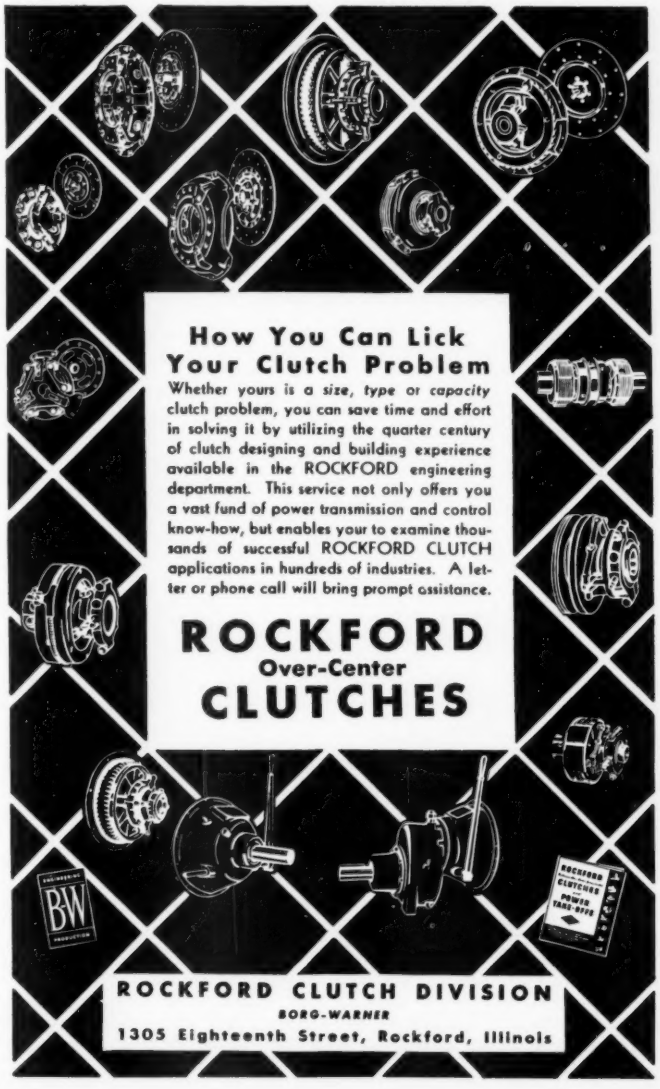
APPALACHIAN FIELD

Tools Bypassed After Unsuccessful Fishing Job

PITTSBURGH.—Dry Fork district, Tucker County, West Virginia, Cumberland & Allegheny Gas Co.'s 1-A-425 Jason Harman et al has resumed drilling after a lengthy fishing job encountered due to a gas blowout at 7,662 ft. The tools have been cemented off and bypassed and the depth is now 7,775 ft. Oriskany sand drilling operations in the Tri-County area—Jackson, Wirt, and Wood—are proceeding at normal rate. A good shallow sand gas well was reported by Columbian Carbon Co. in Grant District, Nicholas County, the 1-1142 Hershel E. Drennen gaged 2,041,000 cu. ft. in the Blue Monday formation, total depth 1,557 ft.

Fifteen new locations in West Virginia were reported: Union District, Jackson County; Triadelphia District, Logan County; Harvey District, Mingo County; Grant District, Pleasants County; Stonewall and Union districts, Wayne County; and Walker District, Wood County.

In Southwest Pennsylvania, Unity Township, Westmoreland County, operations have been started in a deep test, the Peoples Natural Gas Co. 3921 Fred Musnug, located on the Donegal Quadrangle 1.02 miles south of Lat. 40°, 15′ and 1.53 miles west of Long. 79°, 20′. Georges Township, Fayette County, Orville Eberly et al 1 N. E. Murphy, elevation 2,560 ft., is still in a fishing job with the depth of the hole at 7,489 ft.; Wharton Township, William E. Snee et al 3 Indian Creek Coal & Coke Co., elevation 2,615 ft., is at a depth of 7,585 ft. Napier Township, Bedford County, South Penn et al's Snee & Eberly 1 Jesse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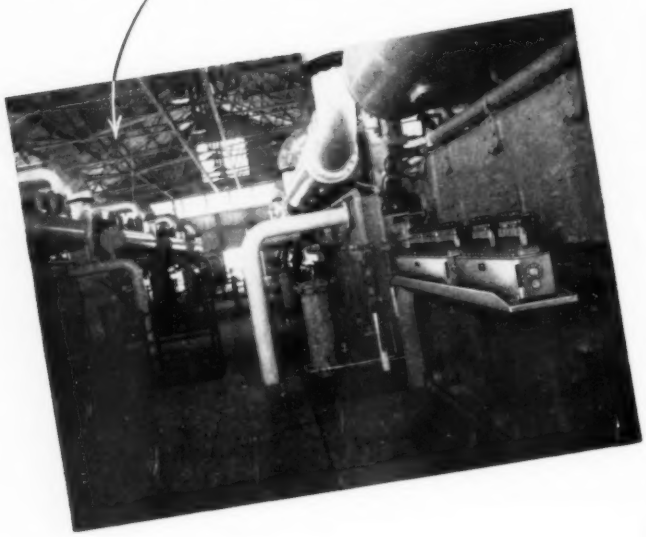

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B. Miller, elevation 1,666 ft., is drilling at 6,902 ft.

Seven new locations in Southwest Pennsylvania were reported: Fawn and Harrison townships, Allegheny County; Kiskiminetas Township, Armstrong County; Buffalo Township, Butler County; and Unity Township, Westmoreland County.

Garrett County, Maryland, Eberly & Snee 1 Geo. H. Blocher, elevation 2,640 ft., recorded Tully lime at 4,105 ft. and drilling is at 4,463 ft.; Fox & Trimble 1 Edw. Kite, elevation 2,520 ft., is drilling at 500 ft.

ILLINOIS BASIN

Dubois County Gets Oil Production

MATTOON.—A good show of oil on a drill-stem test at a wildcat about 2 miles southeast of Jasper in Dubois County, Indiana, indicates that this county may join the ranks of producers in Indiana. The well, B & J Development Co. 2 J. F. Hochgensang, E½ SW NW 7-2s-4w, swabbed 75 bbl. of oil per day from the McClosky at 669-83 ft. after the zone was treated with 500 gal. of acid. Pipe was set on top of the zone tested. Well will be put on pump for further tests.

In the southeastern part of Posey County, Indiana, Superior Oil Co. 1 Philip Jordan, SE SW NW 4-7s-12w, has been completed with an initial production of 50 bbl. per day from the Cypress at 2,290-2,300 ft. as a discovery well between Stooker and East Stooker pools. Walter Duncan is rigging up cable tools to test the Cypress in the south offset, Lydia Noelle, NE NW SW 4-7s-12w.

About 2 miles north of the Jordan well and about 1 mile south of Ford pool, Ashland Oil & Refining Co. and Dee Miller Drilling Co. 1 T. J. Appel et al, SE NE NE 28-6s-12w, had a recovery of 120 ft. of clean oil and 30 ft. of oil-cut mud on a 1-hour drill-stem test of the Cypress at 2,307-19 ft. Bottom-hole pressure was 600 psi. An earlier test at 2,302-12 ft. recovered 25 ft. of oil and 25 ft. of oil-cut mud.

The north end of Innman West Consolidated pool in Gallatin County, Illinois, has an extension and new pay for that part of the pool. E. F. Moran, Inc., 1 Joseph Fromm, SW SE SW 31-7s-10e, had a recovery of 520 ft. of oil and 20 ft. of oil-cut mud with no water on a 2-hour drill-stem test of the Hardinsburg at 2,311-22 ft. ft. Pipe was set on top of the zone. Most of the other production in the north end of the pool is from the Cypress.

Wayne County, Illinois, has a good prospective discovery well in the area about 1 mile southwest of Orchardville. Henson Drilling Co. 1 Richison, NE SE SE 29-1n-5e, is running casing after a drill-stem test of the McClosky at 2,897-2,905 ft. had a recovery of 220 ft. of clean oil and 10 ft. of oil-cut mud with no water. Bottom-hole pressure was 1,000 psi. Zenith South pool was opened last July in the area about 2 miles north of Orchardville with the completion of Illinois Mid-Continent Co. and Aurora Gasoline Co. 1 R. Richardson, NW NE SW 9-1n-5e. This well was completed in the McClosky for 675 bbl. per day. The pool now has 12 producing wells.

In Union County, Kentucky Sun Oil Co. has completed another good Tar Springs well in Morganfield pool. The well, Sun 5 Waggener, 21-O-19, pumped 142 bbl. per day from pay at 1,927-45 ft. Further north in the county in East Caney Mound pool which was opened last August with a good O'Hara producer, Delta Drilling Co. et al 7 John Walker et al, 13-P-20, is expected to resume testing soon. Before being shut down by high water, this well flowed 500 bbl. natural through casing from the O'Hara at 2,511-34 ft.

ILLINOIS WILDCAT FAILURES

Bond County: J. M. Pierce 1 Nungesser, NE SE NW 5-4n-4w, dry, TD 854 ft.

Christian County: L. K. Boyd et al., 1 Hayes, SE SE SE 28-12n-3w, dry, TD 2,145 ft.

Clark County: Mid Globe Oil Co. 1 W. L. Jordan, NE NW SW 7-11n-10w, dry, TD 2,191 ft.

Gallatin County: Oil Management 1 Doerr, NW NE NW 6-9s-9e, dry, TD 2,398 ft.

Madison County: Joe Kesl, Jr., 1 Hosto, NE SE NE 18-5n-5w, dry, TD 682 ft.

Moultrie County: H. C. Sanders 1 Brewer, SE NW SE 5-14n-5e, dry, TD 1,853 ft.

Pike County: Kurfmann et al., 1 Carls, NE NE SW 5-3s-4w, dry, TD 558 ft.

Randolph County: Henson Drilling Co. 1 Maxwell, SE SE NE 31-5s-5w, dry, TD 616 ft.

INDIANA SUCCESSFUL WILDCAT

Posey County: Superior Oil Co. 1 Jourdan, SE SW NW 4-7s-12w, IP 50 bbl., Cypress 2,291-97 ft., TD 2,300 ft.

INDIANA WILDCAT FAILURES

Parke County: O. O. Borden 1 Polletto, NW SE SW 5-16n-8w, dry, TD 1,130 ft.

Warrick County: R. T. McDermott 1 Simpson, SW SW SW 8-4s-9w, dry, TD 2,081 ft.

OHIO, E. KENTUCKY

South Roseville Pool Extended to Southeast

COLUMBUS.—The National Gas & Oil 2 Frank Ransbottom, Section 9, Harrison Township, Perry County, a southeast extension to the new South Roseville pool, drilled the Clinton at 3,477-2,519 ft. with 20 bbl. natural. In the first 24-hour test after a 120-qt. shot, the well made 87 bbl.

A mile southwest, in the same pool, the National Gas 1 Harry Watts, Section 17, found the sand at 3,605-55 ft. with a small oil showing that increased to 20 bbl. after shot. The same company has also drilled in the 1 J. E. Borbing, Section 9, with a very good showing of 23 bbl. natural in 16 hours. The well was shot with 120 qt.

The Oxford Oil 2 Florence Scheibe, Lot 10, Clark Township, Coshocton County, was shot, after standing for some time due to flood waters, and shut in at 1,380,000 cu. ft. The natural open flow was 425,000 cu. ft. from the Clinton at 3,238-3,303 ft.

N. N. Smith et al are drilling in the Lime on a wildcat on Christopher Strehle, lime on a wildcat on Christopher Strehle, Lot 73, Green Township, Scioto County, a mile southwest of the village of Powellsville.

Locations are still down with a total of 14 for the week. Ashland and Knox had 3 each, while Monroe had 2. Ashland and Lancaster fields each had 4 completions out of a total of 15.

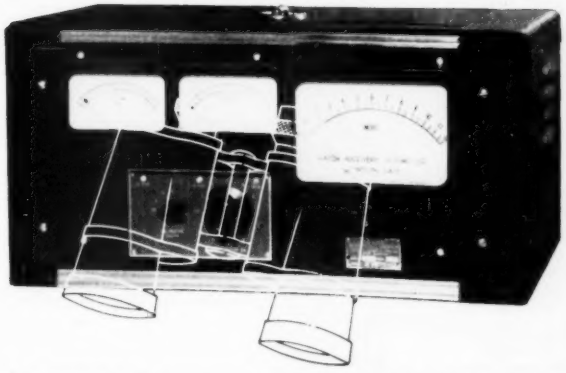
EASTERN KENTUCKY

ASHLAND.—In Clinton County in the old Highway pool Robert Moore et al are drilling at 689 ft. after topping Devonian black shale at 398 ft. The Highway pool was quite active several years ago with large wells being completed in the Stones River (Ordovician) limestone pay. Large flush, however, soon declined and the area has seen little drilling of late.

Also in Clinton County, but farther to the east, in Seventy Six pool Lou Davis 1 drilled by Bardill and Eleason had Devonian black shale at 62 ft. and Pencil Cave at 690 ft. Operators are drilling at 1,600 ft. with the Knox dolomite as their objective.

In Big Sandy gas field United Fuel Gas Co. has recently completed 5379 John F. Phillips on Marts Branch of Johns Creek, Pike County, for 94,000 cu. ft. of gas daily from Devonian black shale at a total depth of 4,518 ft.

EYES
that see 5 MILES AWAY!



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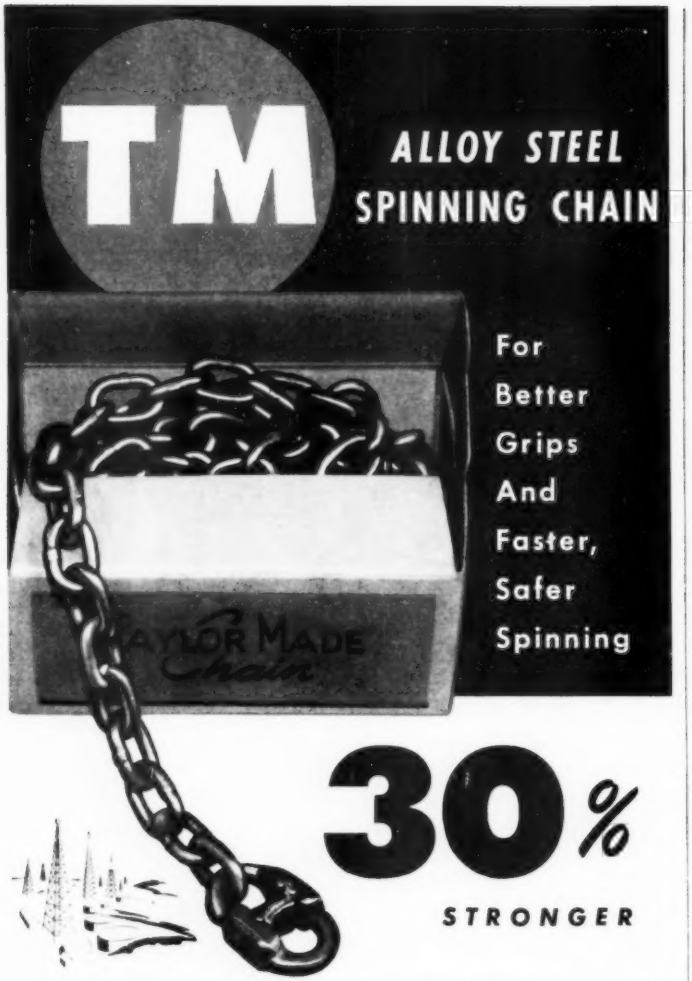

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CALIFORNIA

Los Angeles County Gets Fault Block Discovery

LOS ANGELES—A new fault block discovery has been made ¼ mile north of the east end of the Del Valle field, Los Angeles County, by Southern California Petroleum Corp. The corporation's 1 Kinler, 16-in-17w, drilled jointly with Trigood Oil Co. of Casper, Wyo., flowed, when swabbed, at rates varying from 8-30 bbl. an hour of 22.4 -gravity clean oil from several perforated intervals between 7,128-7,400 ft. The producing formation is equivalent to the Del Valle zone in the field to the south and west.

Universal Consolidated Oil Co. is reported to have cored oil sand in its 1 SM-Humble, 24-32s-19e, 8 miles northwest of Russell Ranch field in the Cuyama Valley, San Luis Obispo County. The top 8 ft. of oil sand, beginning at 3,950 ft., had a good odor but was tight. Fair-looking oil sand was also cored between 4,021-30 ft. Tests of these showings, however, resulted in only a slight rise of gas-cut mud. The operator is coring ahead for the Dibblee sand, principal producing zone in the field. A second well of interest in the area is Superior Oil Co. 18 Government, 2-11n-28w, 3 miles northwest of Russell Ranch field, in which oil showings have also been reported but without confirmation. The operator is coring below 5,875 ft.

Continental Oil Co. 65-E Grubb, a deep test in San Miguelito field, Ventura County, will not be drilled beyond its present depth of 16,704 ft. The operator will test several sand intervals indicated on the electric log in the hope of making a new deeper pool discovery below Grubb 3 pool at approximately 9,100 ft. While all production in San Miguelito field comes from sands of Pliocene age, the well just finished was taken several hundred feet into the Miocene and is bottomed in hard Miocene shale. It is the third deepest well ever drilled in California, being exceeded only by Standard of California 1 Maxwell in the Montalvo area of Ventura County, bottomed at 17,696 ft. in 1948, and Superior Oil Co. 1 Limoneira, also in Ventura County, which was drilled last year to 18,734 ft.

New well locations in California showed an appreciable gain last week, although the total to date this year is considerably below last year for the same period. New locations reported to the State Division of Oil and Gas last week totaled 45 compared to 22 for the previous week. Total new locations to date this year, 258, as compared to 468 to the same date a year ago.

CALIFORNIA WILDCAT FAILURES

Fresno County, Mendota area: L. M. Lockhart 1-29 McNear, 29-14s-15e, dry, TD 6,756 ft., elev. 189 ft.

Kern County, Tejon Hills area: Barnes & Shadrick Core Drilling Co. 6 Anniversary, 9-11n-18w, dry, TD 960 ft., Santa Margarita, 937 ft., elev. 818 ft.

East Cuyama Valley area: R. B. Jackson 1 Stublefield, 20-10n-24w, dry, TD 2,955 ft., elev. 2,910 ft.

Kings County, Pyramid Hills area: Pacific Oil & Gas Development Corp. 76-28 Sharpe, 28-24s-18e, dry, TD 2,540 ft., elev. 756 ft.

Monterey County, Monroe Swell area: The Texas Co. 1 (NCT-1) Doud, 24-19s-6e, dry, TD 4,120 ft., elev. 1,534 ft.

WASHINGTON

In Washington, operators continue drilling at Union Oil Co.'s Ocean City well. Unofficial reports credit the well with a near-commercial recovery of oil on a test last week.

S & R Makes Askins Foreign Sales Representative

S & R Tool & Supply Co., Houston, has announced the appointment of Jack Askins as foreign sales representative with headquarters at 233 Broadway, New York. With the exception of 5 years with the U. S. Army Corps of Engineers, Askins has been engaged in oil industry sales and engineering since 1935. He spent 2 years in South America in an executive capacity for American Rolling Mill Co., A.I.C. Division.

Grove Appoints Truitt to Manage District Sales

C. B. TRUITT

The appointment of Charles B. (Ike) Truitt as Southwestern division sales manager for Grove Regulator Co., has been announced by M. H. Grove. This appointment is in line with the company's policy of increasing its sales-engineering facilities in the southwestern oil-producing areas.

Truitt will make his headquarters at the company's Southwestern division offices in Houston. A graduate of University of Oklahoma, Truitt brings wide experience with both operating companies and oil-field-equipment suppliers in the Southwest to his new position.

Bethlehem Announces New Store, Personnel Changes

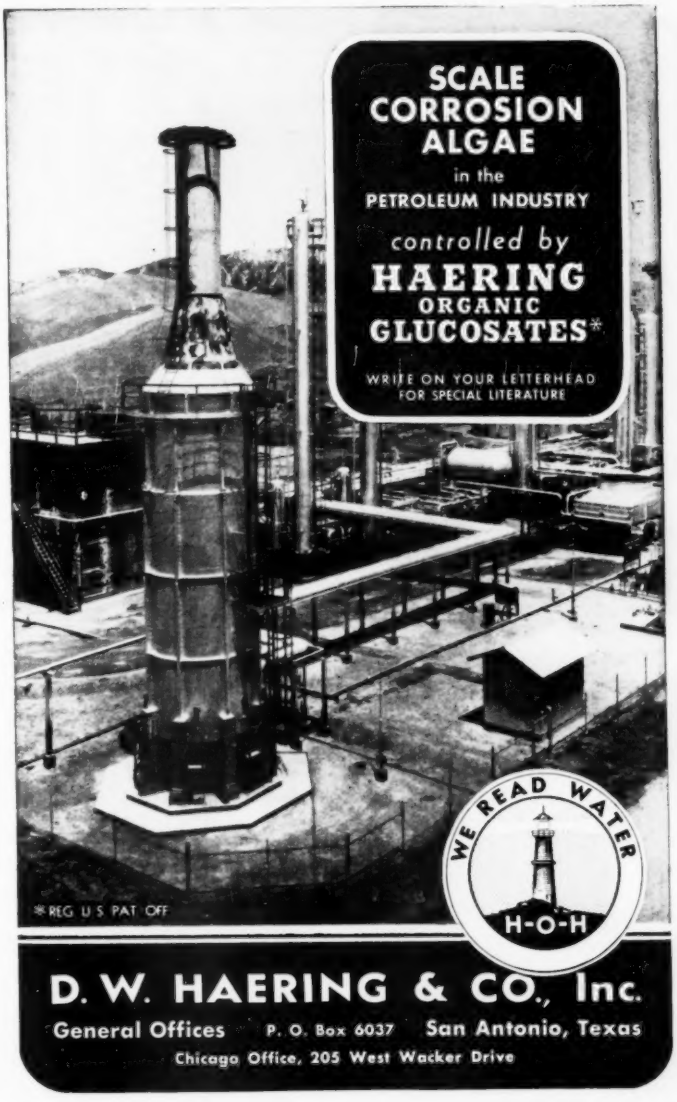
Bethlehem Supply Co. has announced the completion of a new, large, and modern oil field supply store at Great Bend, Kans. The new store carries a complete stock of oil-field drilling and production equipment required to meet the needs of the oil industry in this vicinity.

W. B. Page will continue as store manager and field representative. L. R. Cousland will remain, also, as assistant store manager. Field representatives H. B. Anderson and R. C. Neugent will make local and field sales contacts throughout the area. C. W. Young, special representative located at Garden City for sales coverage in the oil and gas fields in that area, also operates out of the Great Bend store.

Bethlehem Supply has also announced several personnel changes in its field sales organization. O. S. Grover, formerly in the engineering sales department at Tulsa, has been transferred and promoted to the position of chief clerk in the Dallas sales office. W. A. Langbein, formerly assistant district manager at Odessa, has been transferred to Dallas where he will assist in city sales contacts.

C. W. Henry, former special representative at Pampa, Tex., has been appointed store manager and field representative at that point. D. G. Rhoads has recently been employed as engineering representative and will be located in the district office at Shreveport. Curtis Stripling, former assistant store manager at New Iberia, La., has been transferred and promoted to field representative at Houma, La., and will assist in the sales contacts in that store area.

M. R. Griffith has recently been employed as engineering representative and will operate out of Houston. J. D. Wooten, former field representative at Sundown, Tex., has been transferred and promoted to store manager and field representative of the Kermit, Tex., store, and B. L. Applegate, a trainee in the refinery sales department, Tulsa, has been promoted to the position of special representative in that department.



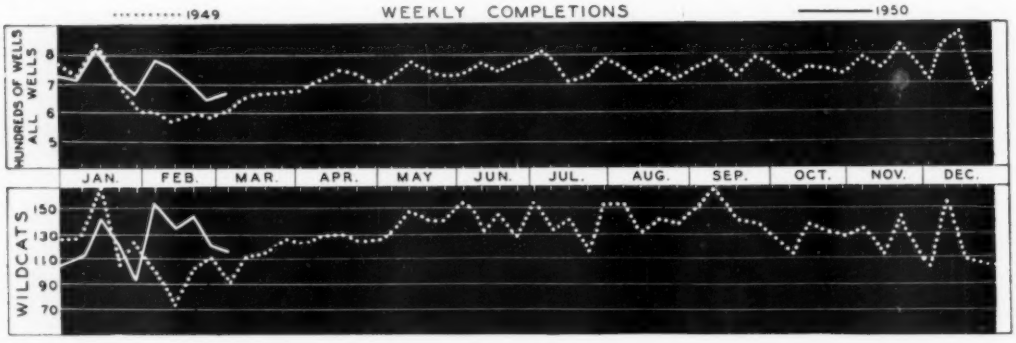
CURRENT STATISTICS

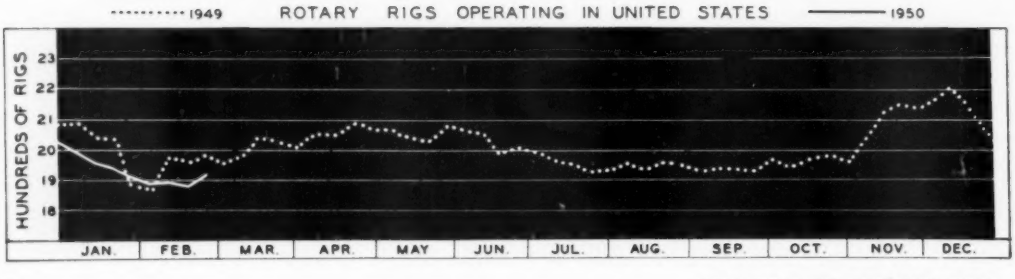
EXPLORATION

WEEKLY WELL COMPLETIONS . . . WEEK ENDED MARCH 4, 1950

	Total of all wells					Mar. 4		Wildcat completions and discoveries									
													Cumulative total, 1950				
	Comp.	Oil	Gas	Dry	Footage	1950	1949	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	7	3	0	*4	10,021	86	264	0	0	0	0	0	0	0	0	0	0
Pennsylvania	19	7	4	†8	29,617	206	448	0	0	0	0	0	0	0	0	0	0
West Virginia	12	3	6	3	24,700	99	88	0	0	0	0	0	0	0	2	2	4
Ohio	15	4	5	†6	33,096	158	214	0	0	0	0	0	1	0	0	2	3
Indiana	18	8	1	9	27,919	165	170	1	0	0	2	3	6	0	1	15	22
Kentucky	12	4	3	5	18,529	131	128	0	0	0	0	0	3	0	0	10	13
Illinois	32	13	0	19	68,291	400	380	0	0	0	9	9	5	0	0	91	96
Michigan	18	7	0	11	53,659	117	150	1	0	0	9	10	8	0	1	53	62
Kansas	61	42	2	‡17	199,862	579	493	2	0	0	7	9	15	0	0	80	95
Neb., Mo., Iowa	5	1	1	3	19,536	14	1	0	0	1	3	4	0	0	1	8	9
Oklahoma	91	61	8	§22	314,390	797	584	3	0	0	10	13	27	2	3	98	130
Texas	280	180	15	85	1,260,458	2,446	2,147	7	1	3	43	54	68	6	28	388	490
North Central (Dist. 7-B & 9)	82	41	2	§39	235,620	727	647	1	0	1	16	18	21	1	8	125	155
West (Dist. 7-C & 8)	97	77	0	20	497,102	711	455	1	0	0	14	15	17	1	0	93	111
Panhandle (Dist. 10)	13	7	4	2	41,374	186	198	0	0	0	0	4	1	0	2	6	9
Eastern (Dist. 5, 6, & 6-P)	19	12	1	6	87,702	174	191	0	0	0	5	5	2	1	1	40	44
Gulf Coast (Dist. 2 & 3)	41	23	7	11	254,762	345	311	3	0	2	4	9	13	1	6	50	70
Southwest (Dist. 1 & 4)	28	20	1	7	143,898	303	345	2	1	0	4	7	14	2	11	74	101
Louisiana	41	31	1	9	230,385	405	358	1	0	0	2	3	12	4	3	34	53
Northern	19	13	1	†5	61,646	212	190	0	0	0	1	1	3	0	0	17	20
Southern	22	18	0	4	168,739	193	168	1	0	0	1	2	9	4	3	17	33
Arkansas	6	3	0	3	23,662	63	38	0	0	0	1	1	1	0	0	19	20
Mississippi	7	5	0	2	46,677	51	59	0	0	0	2	2	1	1	0	15	17
Southeastern States	1	0	0	1	1,603	11	6	0	0	0	1	1	0	0	1	7	8
Montana	1	0	0	1	9,047	21	29	0	0	0	1	1	0	0	0	6	6
Wyoming	11	8	0	3	53,032	111	89	0	0	0	0	0	3	0	0	17	20
Colorado-Utah	0	0	0	0	0	15	19	0	0	0	0	0	0	0	0	12	12
New Mexico	11	7	3	1	53,973	115	97	1	0	0	0	1	6	0	0	10	16
California	29	21	0	8	140,231	316	464	0	0	0	5	5	4	0	1	54	59
Tennessee	0	0	0	0	0	0	11	0	0	0	0	0	0	0	0	0	0
Arizona	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0
Dakotas	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1
Total United States	677	408	49	220	2,618,688	6,307	6,239	16	1	4	95	116	160	13	41	922	1,136
Total previous week	644	362	50	232	2,497,322			13	0	5	102	120	144	12	37	827	1,020
Total March 5, 1949	609	339	37	233	2,218,959			14	1	5	93	113	135	12	27	859	1,033

Service wells included: *4, †8, ‡1, §3, °2.





DAILY AVERAGE PRODUCTION FOR WEEK

	Mar. 4 crude oil	B. of M. Mar. demand	Feb. 25 crude oil
Alabama	1,750	1,200	1,700
Arkansas	80,900	82,000	80,300
California	866,700	834,000	865,600
Colorado	59,200	67,000	59,650
Eastern	56,600	59,900	59,250
Florida	975	1,000	900
Illinois	180,500	180,000	183,200
Indiana	25,900	29,000	27,600
Kansas	276,400	285,000	287,600
Kentucky	25,200	25,000	25,400
Louisiana	524,800	544,000	545,900
North Louisiana	118,950		120,000
South Louisiana	405,850		425,900
Michigan	45,400	45,000	43,700
Mississippi	99,900	99,000	97,450
Montana	23,900	25,000	23,500
Nebraska	1,550	700	1,750
New Mexico	130,000	130,000	130,800
Oklahoma	424,700	413,000	425,050
Texas	1,871,900	2,100,000	1,916,500
Dist. 1 (Southwest)	25,750		25,625
Dist. 2 (Southwest)	112,225		110,575
Dist. 4 (Southwest)	180,425		178,800
Dist. 3 (Gulf Coast)	333,850		364,625
Dist. 5 (Eastern)	26,725		32,000
Dist. 6 (Eastern)	78,575		80,800
East Texas field	234,450		214,800
Dist. 7-C (West)	45,525		46,900
Dist. 8 (West)	553,525		582,475
Dist. 7-B (W. Central)	62,175		62,000
Dist. 9 (N. Central)	129,525		128,900
Dist. 10 (Panhandle)	89,150		89,000
Utah	2,300	1,200	2,500
Wyoming	150,400	128,000	141,000
Total United States	*4,848,975	5,050,000	4,919,350
Change from prev. week, down	70,375		
Canada	72,190		

Total U. S. production January 1-March 4 †312,481,225 bbl.
Same period last year (crude plus cond.) 343,961,570 bbl.

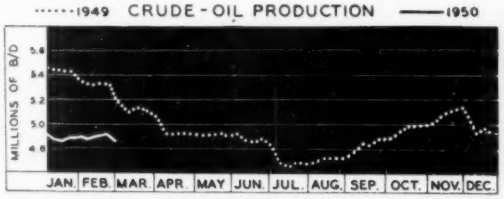
*Not including 90,880 bbl. condensate. †Including 5,792,710 bbl. condensate.

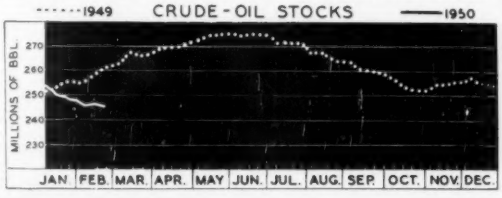
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

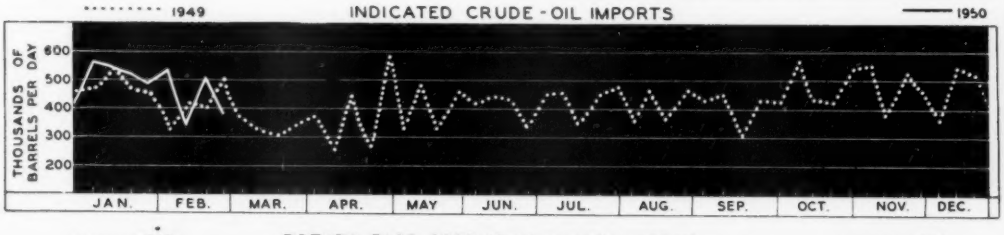
(Thousands of barrels)

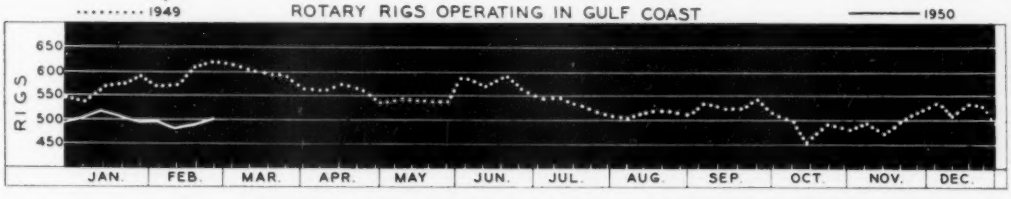
	Feb. 25, 1950	Feb. 18, 1950	Feb. 26 1949
Pennsylvania Grade	2,784	2,762	2,874
Other Appalachian	1,695	1,764	1,454
Illinois, Indiana, Michigan	11,198	11,306	13,027
Arkansas	3,065	3,176	3,205
Louisiana	14,795	14,968	12,251
North	3,575	3,799	3,376
Gulf	11,220	11,169	8,875
Mississippi	2,449	2,648	2,984
New Mexico	7,060	7,308	6,949
Oklahoma and Kansas	35,254	35,269	37,356
Texas	109,031	108,074	125,861
East Texas	14,962	14,245	16,275
West Texas	38,592	38,600	51,061
Texas Gulf	28,325	28,605	30,154
Other Texas	27,152	26,624	28,371
Rocky Mountain	13,514	13,467	12,799
California	37,705	37,767	33,505
Foreign	7,036	7,385	9,700
Total United States	245,586	245,894	261,965

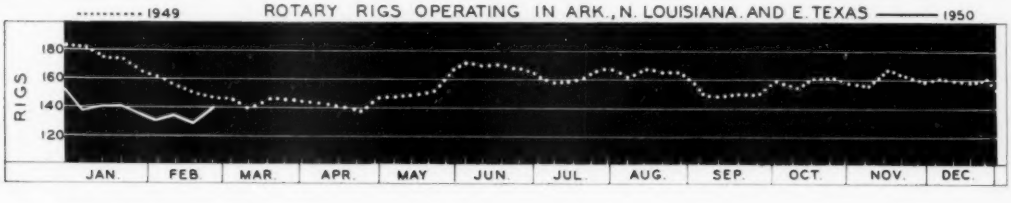
*Bureau of Mines.









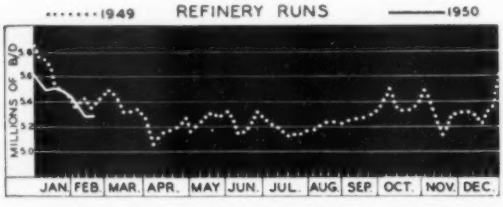

·····1949 ROTARY RIGS OPERATING IN ARK., N. LOUISIANA AND E. TEXAS ——1950
RIGS
180
160
140
120
JAN. FEB. MAR. APR. MAY JUN. JUL. AUG. SEP. OCT. NOV. DEC.

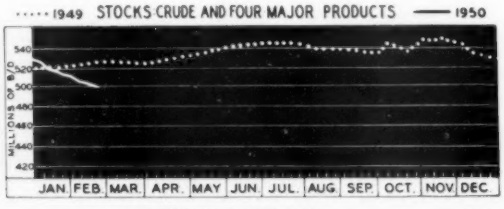
A.P.I. REFINERY REPORT, FEBRUARY 25

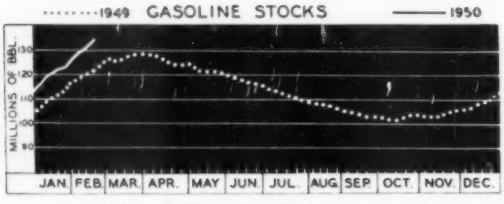
(Thousands of barrels)

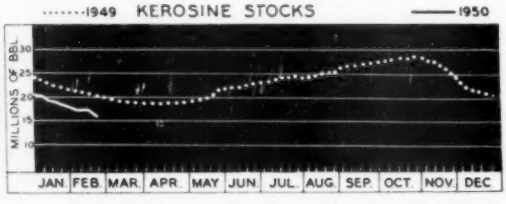
District—	Daily avg. crude runs	Daily average production				Stocks at refineries, bulk terminals, in transit and in pipe lines				Bureau of Mines, February 1949				
		Gasoline*	Kerosine	Distillate	Residual	Gasoline†	Kerosine	Distillate	Residual	Daily avg. crude runs	Daily average production			
											Gasoline*	Kerosine	Distillate	Residual
East Coast	744	332.0	40.3	172.6	209.3	27,131	7,794	18,887	9,638	801	319.6	34.9	162.5	209.2
Appalachian:														
District 1	87	40.6	6.7	13.0	10.9	2,822	365	621	249	99	43.5	6.0	11.8	13.3
District 2	69	31.6	5.6	12.0	13.4	1,102	103	161	111	68	33.6	4.8	6.2	17.5
Ind., Ill., Ky.	916	452.1	63.2	162.6	159.4	27,529	2,687	7,152	2,720	890	446.5	56.8	142.7	169.0
Okla., Kans., Mo.	459	248.8	31.4	88.6	64.4	14,156	456	3,126	873	436	223.6	26.2	84.8	73.9
Inland Texas	195	139.3	11.6	25.1	44.6	4,231	266	694	560	232	151.0	16.9	18.4	54.5
Texas Gulf Coast	1,260	589.7	94.7	225.7	209.0	20,188	2,056	10,048	5,295	1,389	616.7	90.6	278.8	243.6
La. Gulf Coast	437	214.9	38.7	106.6	54.1	7,186	1,262	2,923	2,242	429	185.1	53.8	99.4	61.9
N. La. and Ark.	82	26.0	8.3	11.6	15.0	3,690	267	469	290	72	28.1	9.3	8.0	15.6
Rocky Mountain:														
New Mexico	12	6.1		1.8	2.7	97	25	76	34	10	5.4	0.4	1.3	2.9
Other Rocky Mtn.	174	80.3	4.1	33.4	38.3	4,866	185	1,433	518	152	66.2	3.9	26.7	39.0
California	842	367.6	30.3	131.3	301.0	20,890	761	10,460	26,133	902	364.2	10.3	163.5	381.9
February 25, 1950	5,277	2,529.0	354.9	984.3	1,122.1	133,888	16,227	56,050	48,663	5,480	2,483.5	313.9	1,004.1	1,282.3
February 18, 1950	5,278	2,516.7	342.6	984.3	1,108.3	131,647	17,116	58,090	51,336					
February 26, 1949	5,459	2,517.3	285.3	1,071.3	1,234.0	124,382	19,249	54,008	59,348					

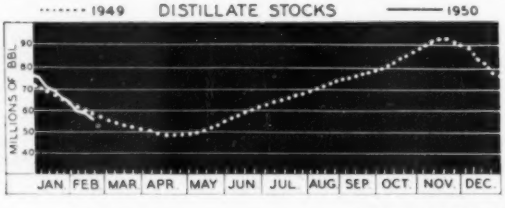
*At refineries including natural blended. †Finished and unfinished.

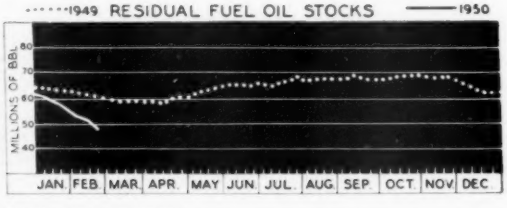


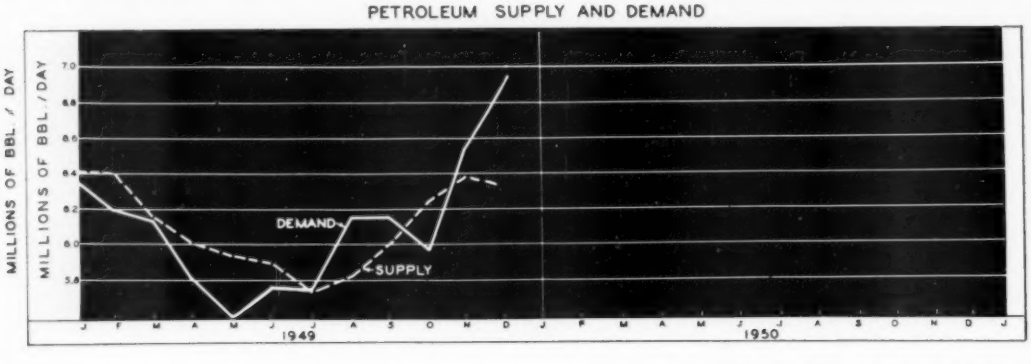












CRUDE PRICES
GRAVITY SCHEDULE

Gravity—	Signal Hill, Calif.	Oklahoma, Kansas	Gulf Coast Tex.*	West Tex.†
18-18.9	$1.53			
19-19.9	1.63			
20-20.9	1.73	$2.25		$2.12
21-21.9	1.82	2.27		2.14
22-22.9	1.92	2.29		2.16
23-23.9	2.02	2.31		2.18
24-24.9	2.12	2.33	$2.56	2.20
25-25.9	2.22	2.35	2.58	2.22
26-26.9	2.31	2.37	2.60	2.24
27-27.9	2.37	2.39	2.62	2.26
28-28.9	2.42	2.41	2.64	2.28
29-29.9	2.48	2.43	2.66	2.30
30-30.9	2.54	2.45	2.68	2.32
31-31.9	2.59	2.47	2.70	2.34
32-32.9	2.64	2.49	2.72	2.36
33-33.9		2.51	2.74	2.38
34-34.9		2.53	2.76	2.40
35-35.9		2.55	2.78	2.42
36-36.9		2.57	2.80	2.44
37-37.9		2.59	2.82	2.46
38-38.9		2.61	2.84	2.48
39-39.9		2.63	2.86	2.50
40 and above		2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point.

†Includes Lea County, New Mexico. Last general price change represented a 50-cent increase becoming effective December 6 1947. Above changes do not include recent reductions of a few buyers applying principally to low-gravity grades.

FLAT CRUDE PRICES

Representative posted schedules per barrel

East Texas†	$2.65
Kettleman Hills, California*	2.77
Beauregard Parish	2.60
Illinois Basin	2.77
Pecos County, Texas (Yates)	2.35
Bradford, Pennsylvania	3.54
Eastern Ill. and Western Ind.†	2.77
Tomball, Texas Gulf Coast	2.83

*37°-37.9°, †35° and above

GROUP 3 and North Texas natural-gasoline prices dropped another ½ cent a gallon on the last day of February to bring the posting for Grade 26-70 on the Group 3 market down to 4 cents a gallon. The wartime ceiling price for this grade established early in 1942 was 4.875 cents a gallon and was later reduced to 4.75 cents, so current quotations are well below the old O.P.A. ceiling. The drop of 1.875 cents a gallon in February was less than the 3-cent decrease in the first quarter of 1949 but the decline in that year started from a top price of 8.5 cents compared with 5.875 cents early in January this year.

Other product prices in the Mid-Continent area have held. Gasoline is readily available, but the absence of distress material indicates that the area as yet has no storage problems.

Residual fuel is still tight but most suppliers feel that the end of the coal strike and spring weather will take care of any general heavy-fuel shortage.

Gulf Coast and New York Harbor residual-fuel prices dropped 15 cents a barrel at a time when Gulf-East Coast stocks were about 7,000,000 bbl. or 30 per cent below last year when the market was considered relatively firm. There are two probable reasons for the cut. It has been reported that some suppliers were using lower priced California fuel to establish their sales position with some of the better accounts. Reduced prices met this competition. The other reason is that it may take at least minor price cuts to hold some of the industrial and utility accounts that were converted to fuel oil during the coal strike.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of March 6, 1950. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Tex. Gulf Coast
Regular gasoline, 74-76 octane	9⅜-9¾	10.5-10.6	9-9¾
Premium gasoline, 78-80 octane	10⅜-10¾	11.5-11.6	9¾-10¾
42-44 w.w. kerosine	8½-8¾	8.8	8-8½
No. 2 straw fuel oil	7⅝-7⅞	7.4-7.6	6¾-7
No. 6 residual	$1.45-1.55	$1.90	$1.50-1.60

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	4	3½	3¾
Grade 18-55	4.8	4.3	4.55

LUBRICATING OILS

South Texas

200 vis., No. 2-3 neutral	10.5
750 vis., No. 3-4 neutral	12.75
2,000 No. 5-6 neutral	14-14.5

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	17
200 vis., No. 3 neutral, 0-10 pp.	11.5-12.5

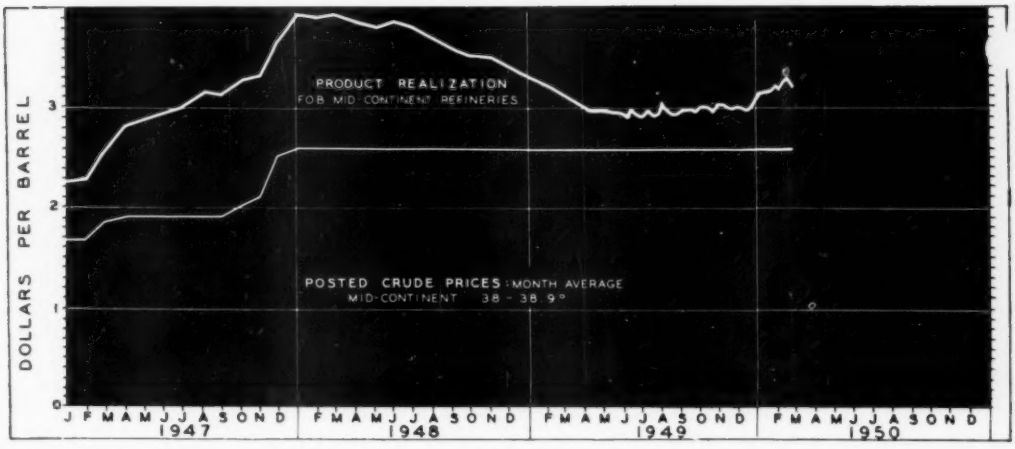
Western Pennsylvania

145-155 vis., 10 p.t. bright stock	19.5-20.5
180 vis., 0 p.t. neutral	20.5-21.5

WAX

Mid-Continent

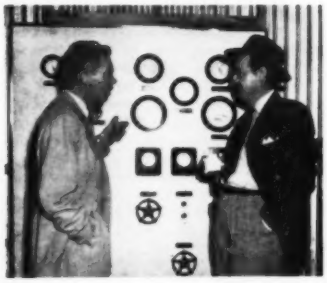
132-134 A.M.P.	4.25



In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate, and fuel oil

EQUIPMENT MEN . . . in the News

Kobe Opens New Field Service Shop at Kilgore



Ray Elner, Kobe Southern area manager, explains operation of test-well control panel to John M. Payne.

Carl Brown, Kobe district manager; J. B. Russell, Jr., and Russell G. Ralph, Kobe Mid-Continent division manager.

In expanding its program to provide additional field service for a rapidly increasing number of hydraulic pump operators, Kobe, Inc., recently opened a new repair shop at Kilgore, Tex. It was the third such shop to be set up in the past few months. In addition to facilities for servicing hydraulic pumps, the shop has a builtin test well in which every pump is run under field simulated conditions before it is released for service. A "Shopwarming" attended by oil men from East Texas and neighboring fields was arranged by Carl Brown, district manager. Russell G. Ralph, Kobe Mid-Continent division manager, and Ray Elner, southern area manager, were on hand for the opening.

H. A. Lovelady Joins Standard Pipeprotection

Herschell A. Lovelady has been appointed manager of sales for Standard Pipeprotection, Inc., St. Louis, with headquarters at Tulsa. He gained a wide acquaintanceship while he was manager of sales for Jones & Laughlin Supply Co., in Chicago, and more recently in the purchasing department of The Texas Co.

Salmon, Rippie, Gaylor Form Consulting Firm

A new independent development and consulting firm has been formed by three well-known members of the petroleum industry. Incorporated in New Jersey as the American Development Corp., the company will maintain offices in New York City with headquarters in Newark. President of the firm is Joseph H. Salmon, who until recently held the position of assistant to the president and economic advisor of Shell Oil Co.

Dr. Charles W. Rippie last week resigned his position as sales development engineer with Lukens Steel Co. to become vice president of the company. Secretary-treasurer is P. J. Gaylor, a consulting chemist and patent attorney formerly with Standard Oil Development Co. In addition to their new affiliation, the three principals in the new company will maintain individual consulting services.

One of several projects which American Development will pursue initially is the further development and licensing of the Gaylor process for electrolytic caustic regeneration of spent treating solutions.

Dallas-Fort Worth Nomads Receive Chapter Charter

Charter for the Dallas-Fort Worth Nomads was presented by H. M. Cosgrove at the February meeting of the group. A. J. Olson, chapter president, accepted the new charter which officially changes the name of the Dallas chapter to the Dallas-Fort Worth Chapter of Nomads.

The Dallas chapter was organized in 1946 and the present membership of nearly 100 includes oil-equipment men from all centers adjacent to the twin-city area. By changing the name, recognition is given to the active members from Fort Worth, Wichita Falls, and Weatherford. The majority of the meetings will be held in

H. M. Cosgrove, executive secretary of the Tulsa Chapter of Nomads, presents the new Dallas-Fort Worth charter to A. J. Olson, Continental Supply Co., president of the Dallas-Fort Worth Chapter.

Otis Officials Hold Three-Day Meeting in Dallas

District superintendents and other key personnel of Otis Pressure Control, Inc., participated in a 3-day meeting in February at the home office of the company to discuss bottom-hole-pressure tools and other new Otis equipment and to review a new operating manual which will be distributed to employes. Present for the meeting were C. E. Ivey, chief inspector; H. C. Laird, vice president and production manager; T. G. Garwood, Gulf Coast district sales manager; B. C. Brown, Oklahoma City district superintendent; D. E. Daffin, Houston division superintendent; R. L. Green, Odessa district superintendent; Mary E. Warren, firm secretary; W. E. Rich, treasurer; H. C. Otis, president; George Hart, export representative; E. A. Kelley, New Iberia division superintendent; I. A. Miller, general superintendent; L. M. Wilhoit, general sales manager and assistant general superintendent; Bob L. Crain, Longview district superintendent; J. D. Toole, Corpus Christi division superintendent; H. C. Otis, Jr., director; and W. L. Long, general tubing superintendent.

Dallas but several meetings throughout the year will be held in Fort Worth.

Dennis to Manage Graver Stainless and Alloy Sales

Graver Tank & Manufacturing Co., Inc., East Chicago, Ind., has announced the appointment of Harry A. Dennis as manager of sales for the company's Stainless and Alloy Steels Division. He will also continue his present assignment as manager of Weldment Sales. Prior to his association with Graver, Dennis was assistant district manager of sales for Lukens Steel Co., and its By-Products and Lukenweld division.

Robinson Will Manage New Franklin Houston Office

E. W. ROBINSON

The opening of a new Franklin Supply Co. district office in Houston has been announced by Larry Harper, Franklin vice president, Tulsa. E. W. "Bud" Robinson, former assistant sales manager for WKM Co., in Houston, has been appointed district manager. The offices are located in the Esperson Building. Office manager is Bill Carroll from Franklin's Grayville, Ill., branch. Other Franklin offices and stores are located in Chicago; Mt. Pleasant, Mich.; and East Chicago, Ind.

Nelson Appoints Randolph As Sales Representative

Nelson Electric Manufacturing Co., Tulsa, has announced the appointment of H. J. Randolph Co. as its sales and service representative in the Los Angeles area.

Randolph has been associated with the oil industry in electrical engineering and field sales work. An engineering graduate from Iowa State College, he spent 7 years with Westinghouse Electric Corp., followed by several years of field work with other manufacturers. In July 1949 he organized H. J. Randolph Co.

Farley to Manage New Caterpillar Plant

T. R. FARLEY

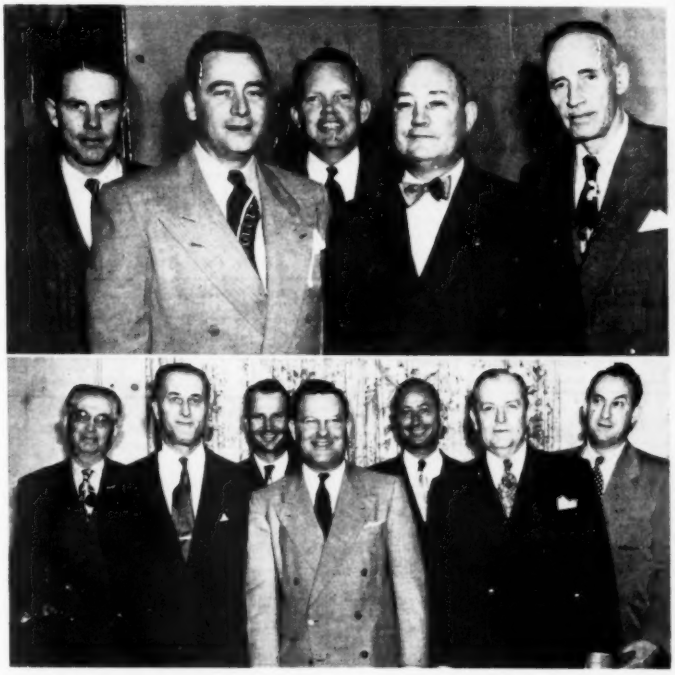
T. R. (Ted) Farley, vice president of Caterpillar Tractor Co., has been named general manager of Caterpillar's new plant to be located 2 miles southwest of Joliet, Ill., according to an announcement by L. B. Neumiller, company president. Farley joined Holt Manufacturing Co. at Peoria, Ill., in 1919 and since that time has acquired an unusually broad background of the manufacturing and merchandising of the company's products. As assistant export manager of Holt Manufacturing, he spent some 10 years traveling in foreign countries in the development of markets and established many of the still-existent export distributorships. He was actually in Chile at the time Caterpillar Tractor Co. was organized in 1925 by the merging of the Holt Manufacturing and C. L. Best Tractor Co., the two pioneer manufacturers of track-type tractors.

In 1940 he was elected vice president of Caterpillar and in 1942, retaining his vice presidency, he became vice president of Caterpillar Military Engine Co., a wholly owned subsidiary organized for the purpose of designing, constructing, equipping, and operating the Victory Ordnance Plant at Decatur, Ill.

In November 1942, when B. C. Heacock, then president of Caterpillar Military Engine, accepted a call from War Production Board to fill an important post on the WPB staff in Washington, Farley assumed full charge of the engine company, with an advancement in title to executive vice president. In 1944 he was elected president and continued in that capacity until the products from that plant were no longer required by the War Department. After the engine company was dissolved in the fall of 1946, Farley returned to Peoria in charge of special projects.

(Continued on page 153)

Houston Nomads Entertain Many Visitors



It was visitors' night at the February meeting of the Houston Nomads as the chapter entertained guests from Hughes Tool Co. and Baker Oil Tools. Both companies were holding sales meetings in Houston at the time. In the upper picture are Baker Oil Tools representatives: W. S. Althouse, R. L. Turner, R. S. Fobes, Ted Sutter, and H. W. Pullman, all of Los Angeles. In the lower picture, Hughes Tool Co. representatives are: front row, R. G. Roberts, London, England; Monty Montrose, Houston; W. S. Siems, New York City; back row, C. J. McLaren, Los Angeles; A. K. Baebel, Maracaibo, Venezuela; Shelby Chambless, Caracas, Venezuela; and O. B. Labrobe, New York City.

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EQUIPMENT FOR SALE

FOR SALE: 1—36-L Bucyrus Rig, 1948 model, complete with all tools. Phone 2032, Henderson, Kentucky.

FOR SALE: One Wilson Mogul Double Drum rig, complete with 98' L.C. Moore derrick and 14" Bethlehem pump. In excellent repair, drilling capacity 6,000'. Will sell with or without 4,000' 3½" modified drill pipe. Priced for immediate delivery $52,000.00, subject to prior sale. Mack Well Servicing Company, P. O. Box 29, Alice, Texas.

FOR SALE: Hall-Scott Defenders 650 hp. left or right hand rotation, direct drive. Excellent condition. Priced from $1200-$1800. L. E. Northrop, Jr., 1225 Flanders Rd., LaCanada, Calif.

TWO CARDWELL DOUBLE-DRUM SPUDDERS: All tools, light plants, doghouses, portable masts. Also, 5,000 feet 4½" usable drill pipe. Wallace, Box 4563, Oklahoma City, Okla., Phone 62-2415.

FOR SALE

3—10 x 4¼ x 10 XOB Ingersol-Rand Compressors. Completely repaired with intercoolers. Also 20" Stroke Compressor Cylinders in most sizes, 6¼" to 26".

W. S. SMITH
205 Thompson Bldg. Phone 2-5473
Tulsa, Oklahoma

Several Army Surplus 4½" x 6" Gaso Duplex 1860 Pumps—two piece skid mounted with Chrysler 8 cylinder engines. Will sell pumps only or complete units about half price.

H. H. COFFIELD
ATTN: W. H. Orr
Phones: 132—Rockdale, Texas
A-86064—Houston, Texas

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FOR CABLE TOOLS
DEGEN PIPE AND SUPPLY CO.
Box 107, Red Fork Station, Tulsa, Oklahoma

FOR SALE: Two steel mud tanks, 5 feet by 8 feet; 30 feet long, made of ¼" steel, sloping bottom. Never been used. $3200. Located Makin Drilling Company's yard, Hobbs, New Mexico.

ONE Skid mounted 5 x 10 Gardner Denver Pump with 525 Buda Engine used to drill five shallow holes—$3000.00. Riverside-6811, Dallas, Texas.

FOR SALE: One Star A-83 Speedster in excellent condition. For information, call Carl A. Lesh, Hart, Michigan, or D. B. Lesh Drilling Company, St. Elmo, Illinois.

FOR SALE—Kobe triplex power unit Ser. No. 3200-001, size 2-B-2RG, direct driven, mounted on power base. Flexible engine coupling, booster pump and drive, single chemical feed, chemical tank and drive, engine beds, guards, and miscellaneous piping. ALSO, 1 Kobe triplex power unit Ser. No. 3300-111. Same as above. Both practically new and in good shape. Can be seen on lease west of Okemah, Oklahoma. For information phone 2-8095, Tulsa.

WAR SURPLUS MACHINERY
Gaso, Byron Jackson, Aurora, Wayne Lombard, & Hale Fire Pumps with Engines, 1½ to 25 KW Generator Sets or Light Plants, Engines, Suction Hose, Fire Hose, Victaulic Couplings & Etc. Write for listing. H. A. McCarthy, 310 Thompson Bldg., Phone 5-3296, Tulsa, Oklahoma.

MODEL KS Cardwell Single Drum Hoist, SRK Waukesha. No mast. Will accommodate Spudding Attachment. Excellent Condition. Model HL Cardwell Double Drum Drawworks, 140GK Waukesha. Convertible to Spudder. Good Shape. Both running in Kansas and priced right. Box D-400, The Oil and Gas Journal, Tulsa, Oklahoma.

COMBINED VAPOR SEPARATOR & FRACTIONATOR FOR THERMAL REFORMING

One—New 5'-6" ID x 61'-0" over-all height Bubble Tower made of 1¼" Plate and lined throughout with 5/64" and 7/64" thick, 11-13⅞ Chrome stainless steel, type 405. Stainless steel support plates in place for 15 Trays (Trays not included). Constructed in accordance with the API-ASME Code, stress relieved and radiographed. Designed for 400 PSI at 750° F. Fabricated by A. O. Smith Corporation. Platform and ladder clips installed.

FRACTIONATING TOWER

One—New fractionating tower, 5'-0" I.D. x89'-6" over-all height x 1¼" plate. Thirty-four bubble trays, ten 18" 300± manways. Stress relieved and built in accordance with API-ASME Code for 350 PSI working pressure.

WOOD RIVER OIL & REFINING CO., INC.
501 K.F.H. Building
Wichita, Kansas 5-5674

EQUIPMENT FOR SALE

ONE Set 12" x 52 ft. National Shear Poles, complete with traveling block, casing line and guy lines. Everitt-Whiting, Inc., 725 Wright Bldg., Tulsa. Phone 4-6082, Tulsa, or 750, Okemah, Okla.

SEISMOGRAPH EQUIPMENT FOR SALE: Two 2-Ton Chevrolet Coleman 4-Wheel Drive water trucks. 500 gallon tank completely winterized, vacuum fill, Tulsa winch, etc. Excellent condition, low mileage. Original Cost $6600.00—Sale Price $4000.00.

One ½-Ton Chevrolet crew and field service unit. Bed enclosed with steel, cab with heater, 65 gallon gas tank with gear pump. 7:50 x 15 tires. Low mileage. Original Cost $2800.00—Sale Price $1800.00. Riverside-6811, Dallas, Texas.

ONE 24" drilling bit with 4" x 5" pin; one 20" casing spider with 20" x 20" slips; one 20" Dunn elevator. Creston Supply Company, 725 Wright Bldg., Tulsa, Oklahoma. Phone 4-6082.

FOR SALE: Used Cooper Skid Model E well servicing unit, mounted on 6X6 GMC with new motor and good rubber. With or without 8 X 10 X 60 ft. mast and tools. Unit located at Seminole, Okla., Box D-388, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: 1—Cardwell K Double Drum Unit unitized with GAK Waukesha. 1—7¼-x 18 Model 7P Wilson-Snyder Pump. 1—7¼ x 12 Clark Triplex Pump. 1—7¼ x 10 Model EE-PXD Gardner-Denver Pump. 1—4 x 6 Fig. 6161-A Fairbanks-Morse Pump. 1—1⅜ x 3 Union Triplex Glycol Pump. 2—D13000 Caterpillar Diesel Engines. 2—PA100 International Engines. 1—77/8 x 8¾ Hughes Type J Core Barrel. 1—A250 Bethlehem Crown Block. 1—Deckard Monkey Board for 136'-30' Base Derrick. 1—Hunt Tool Monkey Board for 129'-24' Base Derrick. 1—13⅜ SDA Cameron Blowout Preventer c/w 13⅜ Pressure Operated Gate Valve. 1—Set (2) 7'4" wide x 10' high x 21' long Substructure c/w walkways, handrails, and steps. 1—Type B-6 Emsco Swivel. 10—5¼" OD x 30' Drill Collars in tandem of 5 each. 1—24" x 48" Link Belt Mud Screen c/w Model AEH Wisconsin Motor.

All equipment completely overhauled.
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Designed for Standard-Vacuum Petroleum Maatschappij to run 35,000 to 45,000 B D of Sumatra Crude. Can be adapted to run sour crudes.

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For complete information, telephone or telegraph:

Mr. E. H. Clendenin
Standard Oil Development Company
P. O. Box 121, Linden, New Jersey
Telephone: Elizabeth 2-3900

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USED ROTARY AND CABLE TOOL DRILLING TOOLS. WIRE LINES. E. A. KELLY, BOX 861, OKLAHOMA CITY, PHONE 5-6407.

FOR SALE: New skid mounted Beaird-Ingersoll Rand two stage gas compressor plant, 225 horsepower. Suitable for gas lift or pressure boosting service. W. C. McBride, Inc., 1904 Milam Bldg., San Antonio, Texas.

MUD Hog Pump 7¼ x 12 Gardner-Denver, and other drilling equipment. See at Garrett Equipment Co., Wichita Falls. Make an offer to D. F. MacKinnon, 3200 Main Street, Dallas, Texas, Phone C-6415.

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PHONE: COTTON VALLEY 26

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WILL BUY 37,000 or 55,000 bbl. tanks with steel roofs, either standing or cut down. Atlas Tank & Steel Co., P. O. Box 2297, Tulsa, Oklahoma.

SMALL CORE DRILL capable of 750' drilling with N-rod pipe. State make, year made, price, and condition. Box D-414, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED TO BUY: 28-L Bucyrus, in good condition and priced right. Write or wire: H. A. Pixler, Box 542, Casa Grande, Arizona.

WANTED: COMPLETE power rotary rig in excellent condition, 5,000 or 7,500 ft. capacity. Write giving location, price, and complete description to John Snyder, P. O. Box 258, Billings, Montana.

INTERESTED in small portable double-mast rig, capable of drilling to approximately 2000 feet, with or without drill pipe. Equipment must be in good condition and reasonably priced. Preferably located in Southwest Texas. Contact

MAKIN DRILLING COMPANY
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HELP WANTED

HIGH type, responsible executive wanted as Manager Latin-American operations for substantial independent producing company entering foreign operations. Applicant should be college graduate, under 40 years of age; have minimum 15 years' experience in production and drilling work, particularly in high pressure oil and gas well completions. Applicant should speak Spanish fluently, have thorough experience in development Geology, be equipped to prepare and maintain adequate reservoir and engineering studies including repressuring and pressure maintenance. Excellent compensation. When replying, give full details. Our present employes not considered for this position. Box D-364, The Oil and Gas Journal, Tulsa, Oklahoma.

FOREIGN and Domestic Oil Employment Directory (including late supplement of oil companies and drilling contractors in Western Canada). Over 500 listings in drilling, production, refinery, natural gasoline, pipelines, geological, exploration, supplies, manufacturers, services and refinery and pipeline contractors, showing where to apply for jobs. Price $5.00. Oil Industry Mailing List, Box 2603, Tulsa, Okla. (Our 30th year).

WANTED: Instrument man with experience in oil refinery and chemical plant instruments. Denver location. State age, experience, and salary expected, in first letter. Box D-373, The Oil and Gas Journal, Tulsa, Oklahoma.

MAN wanted to operate receding head Landis Pipe Threading Machine. Permanent job. Petroleum Pipe & Supply Co., P.O. Box 1168, Corpus Christi, Texas.

Assistant
Chief Draftsman

. . . major Oil Co. has opening for a graduate mechanical engineer with extensive experience in design & drafting of petroleum equipment to supervise draftsman engaged in piping, structural, electrical, & marine work. Candidates should have heavy petroleum background plus previous supervisory experience.

Age 40 to 45 preferred. Starting salary $9,690. This is a permanent position with opportunity for advancement. State education, experience, & personal history.

Reply in confidence
To Mr. H. M. OVERLEY
P.O. Box 7258, PHILADELPHIA 1, PA.

SITUATIONS WANTED

LANDMAN, 2½ years major company, 30, single, B.A. degree; abstract & title experience, office management; desires position with future based on demonstrated ability. Box D-399, The Oil and Gas Journal, Tulsa, Oklahoma.

SALES: PETROLEUM SPECIALTIES: B. S. Organic Chemistry, patents, five years research, three years sales and market development. Desires position with refinery to develop new industrial markets for solvents, waxes and oils. Box D-395, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST—30 yrs. old—2 yrs. roughnecking, 7 yrs. surface and subsurface geological work with major company in Canada, U. S., and South America, desires association with aggressive independent operator, or drilling contractor who is active in wildcatting. Prefer Rocky Mtn. area, or Canada. Pertinent details and references given on request. Box D-402, The Oil and Gas Journal, Tulsa, Oklahoma.

ADSORPTION Specialist; licensed chemical engineer, 32. Extensive contacts in gas, refining, chemical construction industries. Research, pilot plant, patent, administrative experience. Desires responsible position in research, development or technical sales. Box D-416, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas, and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No 131, Ph. No. 131, Hobbs, New Mexico.

MECHANICAL ENGINEER: MIT graduate, age 28, married with civil engineering experience and varied petroleum background, including Louisiana Coast, desires position with independent oil company or company connected with oil business. Now in Chicago, will relocate. Box D-413, The Oil and Gas Journal, Tulsa, Oklahoma.

SALESMAN—Married man, 32, with B.S. Degree, major in Geology and Business Administration, wants job selling oil field equipment, supplies, or services. Box D-408, The Oil and Gas Journal, Tulsa, Oklahoma.

PURCHASING Agent, thoroughly experienced. Also Right of Way procurement and Accounting and Auditing. Age 42. Prefer west coast. Box D-415, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST, B.S. Geological Engineering, M.S. Geology, diversified field and subsurface experience. Desires change. Box D-410, The Oil and Gas Journal, Tulsa, Oklahoma.

LAWYER: L.L.B., L.L.M., heavily experienced, seeks connection with firm or individual. Excellent references. Salary and location open. Box D-411, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEERING Degree, 1943, Age 30, Married. Experience: Geophysical Surveyor, 3 years; Air Corps, 18 months; 5 years production and drilling. Desire Foreign employment. Now employed. Box D-412, The Oil and Gas Journal, Tulsa, Oklahoma.

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FOR SALE: Oil and Gas Leases and drilling propositions in shallow territory of Allen, Simpson, and Warren Counties, Kentucky. W. P. Harley, Bowling Green, Kentucky.

80-ACRE lease in Artesia pool for sale with drilling obligation—shallow. 640 acres in Loving County, Texas—shallow, Delaware, and deeper; between Wheat Pool and Kyle Pool. Large tract in Panhandle in trend 1½ to 3 miles from a pool of ten producing wells. John P. Mathis, P.O. Box 1106, Amarillo, Texas.

WANT an Oil Well? Proven, semi-proven and large wildcat acreages, FREE for drilling, 1/6 reserved, HOT SPOT, Loving County, Texas. E. L. Stratton, Owner, Pecos, Texas.

FOR SALE: 80 acres, new ten-year lease, East Samford Survey, Shelby County, Texas, will sell ½ or all, $5.00 per acre. Surrounded by major company's holdings. C. A. Parker, Polley Hotel, Center, Texas.

WE BUY PRODUCING
Oil and Gas Leases. Drilling Deals also considered. State complete details in letter to be held in strictest confidence. Box D-380, The Oil and Gas Journal, Tulsa, Oklahoma.

INTERESTED IN DRILLING BLOCKS of ten thousand or more acres in North Dakota. Box D-403, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: Oil and gas leases, drilling blocks, and royalties in Kentucky and Tennessee. Write: Harvey Daugherty, Horse Branch, Kentucky.

WEST TEXAS DRILLING BLOCKS
We have six large drilling blocks in West Texas and New Mexico to sell. Details on request. We also have many cheap minerals and royalties. Navarro Royalties Company, Odessa, Texas.

OIL LEASE FARMOUTS
N. W. Georgia, shallow Pennsylvania formations, sandstone, shale, limestone. Deming, Box 320, Waycross, Ga.

TENNESSEE—800,000 acres timber land—$3.50 per acre, all minerals included. Details: Earl Jester, 12744 Vanowen, North Hollywood, Calif.

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Bought and Sold—Any Area
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WANTED

EXPERIENCED GEOLOGIST

Seeks capital backing for application of a new and technically sound method of mineral prospecting. For details write:

Box D-401

THE OIL AND GAS JOURNAL
Tulsa, Oklahoma

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EQUIPMENT MEN

(Continued from page 149)

Corrosion Engineers See Machinery Manufactured

One of the interesting features of the short course on practical control of pipe-line corrosion conducted by the Tulsa section of the National Association of Corrosion Engineers February 20-23 was a tour of plants manufacturing pipe-line equipment.

R. L. Bullock, Interstate Oil Pipe Line Co., Tulsa, who acted as chairman of the short course, had emphasized the importance of research and development being done by equipment manufacturers in putting better equipment in the field.

Manufacturing firms visited were: Crutcher-Rolfs-Cummings; Perrault Brothers, Inc.; and M. J. Crose Manufacturing Co. One of the unusual features of manufacturing pipe-line construction machinery is the fact that the equipment has to be fabricated on a section of pipe of the diameter for which the machine is intended. The tour gave corrosion engineers a chance to see machines they use in the field, in the process of being made.

Bo Bardsley, host at Crutcher-Rolfs-Cummings, demonstrated the new type bending machine, a pipeline locater, a holiday detector, the cleaning and priming machine, and the coating and wrapping machine. Crutcher-Rolfs-Cummings is generally credited with first producing machines that made modern mechanical coating practices possible.

R. E. (Bob) Shackelford, sales manager of Perrault Brothers, Inc., pointed out the features of a coating and wrapping machine for 34-in. pipe that was being constructed, of a coating and wrapping machine that incorporates hydraulically operated, revolving weirs that apply the coating, now in process of development, a live roller cradle, and a cleaning and priming machine with counter rotating heads.

D. M. (Mike) Curran, sales manager of M. J. Crose Manufacturing Co., emphasized the new spray-type coating and wrapping machine being built by Crose, a new road boring machine being developed, a portable pipe-buffing machine, and an internal line-up clamp that has recently been redesigned. Also on exhibit was the Tipton pipe patch designed by Jack Tipton for repairing leaks in line pipe. The device relieves pressure and vents vapors during patching operations.

Shepherd Named Traffic Manager for Beacon

Beacon Petroleum Co. of Tulsa and Chicago has announced the appointment of R. B. Shepherd as traffic manager.

Shepherd has long been associated with the petroleum industry. His many years of experience in traffic work for Anderson-Prichard Oil Corp., Stanolind Pipe Line Co., and British-American Oil Co. well qualify him for his new position.

Beacon is rapidly expanding its facilities in the butane-propane field and is engaged in a new program to cut delivery time to a minimum.

Riddell Assigned to South America by United

C. E. Riddell has recently been assigned as manager of Brazilian and Chilean operations for United Geophysical Co., Inc., with headquarters in Rio de Janeiro. He has replaced Lawrence K. Morris, who is returning for an assignment in United's main office at Pasadena, Calif.

C. C. Lister, manager of foreign operations for United Geophysical, has just returned to Pasadena from a trip to South America, which included an inspection of United's operations in Venezuela and Brazil.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D. C. Notice is hereby given that 9 parcels of land containing in all 1080 acres in T. 46 N., Rs. 63 and 64 W., 6th P. M., Wyoming, within the known geologic structure of the Osage field, will be offered for oil and gas leasing through competitive bidding, at 1 p. m. on April 12, 1950, when bids will be opened. Details of the lease offering, how and where to file bids and a description of the lands may be obtained by addressing an inquiry to the Manager, Land and Survey Office, Cheyenne, Wyoming, or to this office. Marion Clawson, Director.

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CALENDAR

March

American Chemical Society, Houston meeting, Shamrock Hotel, Houston, March 26-30.

North Texas Oil and Gas Association, Kemp Hotel, Wichita Falls, March 25.

Southern Gas Association, Galveston, Tex., March 27-29.

Western Petroleum Refiners Association, annual meeting, Plaza Hotel, San Antonio, March 27-29.

American Petroleum Institute, Division of Production, Mid-Continent district meeting, Skirvin Hotel, Oklahoma City, March 29-31.

April

American Petroleum Institute, board of directors meeting, Houston, April 3-4.

National Association of Corrosion Engineers, annual conference, Jefferson Hotel, St. Louis, Mo., April 4-7.

American Chemical Society, Philadelphia meeting, Philadelphia, April 9-13.

American Society of Lubrication Engineers, annual convention, Hotel Statler, Detroit, April 10-12.

American Society of Mechanical Engineers, Hotel Statler, Washington, D. C., April 10-14.

Southwestern Gas Measurement Short Course, University of Oklahoma, Norman, Okla., April 11-13.

National Petroleum Association, Hotel Cleveland, Cleveland, Ohio, April 12-14.

American Petroleum Institute, Division of Production, Rocky Mountain district meeting, Gladstone Hotel, Casper, Wyo., April 13-14.

American Chemical Society, Detroit meeting, Detroit, April 16-20.

Petroleum Industry Electrical Association and Petroleum Electric Supply Association joint conference, Shamrock Hotel, Houston, April 18-20.

Natural Gasoline Association of America, annual convention, Texas Hotel, Fort Worth, April 24-26.

American Association of Petroleum Geologists, Society of Economic Paleontologists and Mineralogists, and Society of Exploration Geophysicists, joint annual meeting, Stevens Hotel, Chicago, April 24-27.

Oil Heat Institute of America and National Oil Heat Exposition, annual meeting, Commercial Museum, Philadelphia, April 24-May 1.

American Petroleum Institute, Division of Production, eastern district meeting, Cleveland Hotel, Cleveland, April 26-28.

May

American Petroleum Institute, Division of Refining, midyear meeting, Hotel Cleveland, Cleveland, May 1-4.

Interstate Oil Compact Commission, spring meeting, Biloxi, Miss., May 4-6.

National Stripper Well Association, Biltmore Hotel, Los Angeles, May 7-9.

Independent Petroleum Association of America, midyear meeting, Biltmore Hotel, Los Angeles, May 7-9.

American Gas Association, Natural Gas Department, spring meeting, Mayo Hotel, Tulsa, May 8-9.

Liquefied Petroleum Gas Association, annual convention, Palmer House, Chicago, May 8-11.

American Petroleum Institute, Division of Production, Pacific Coast district meeting, Biltmore Hotel, Los Angeles, May 11-12.

American Gas Association, production and chemical conference, Hotel New Yorker, New York, May 22-24.

American Institute of Chemical Engineers, regional meeting, New Ocean House, Swampscott, Mass., May 28-31.

Gas Technology Short Course, Texas College of Arts and Industries, Kingsville, Tex., May 29-31.

June

National Oil Scouts and Landmen's Association, Skirvin Tower Hotel, Oklahoma City, June 8-10.

American Society of Mechanical Engineers, oil and gas power division, Lord Baltimore Hotel, Baltimore, June 12-16.

Pennsylvania Grade Crude Oil Association, Hotel William Penn, Pittsburgh, Pa., June 15-16.

American Society of Mechanical Engineers, Hotel Statler, St. Louis, June 19-23.

Canadian Gas Association, annual convention, Manior Richelieu Hotel, Murray, Quebec, Canada, June 20-24.

American Society for Testing Materials, annual meeting Chalfonte-Haddon Hall, Atlantic City, N. J., June 26-30.

American Petroleum Institute, midyear division of production and standardization conference, Brown Palace Hotel, Denver, June 26-30.

August

Interstate Oil Compact Commission, summer meeting, French Lick, Ind., August 3-5.

NOMADS

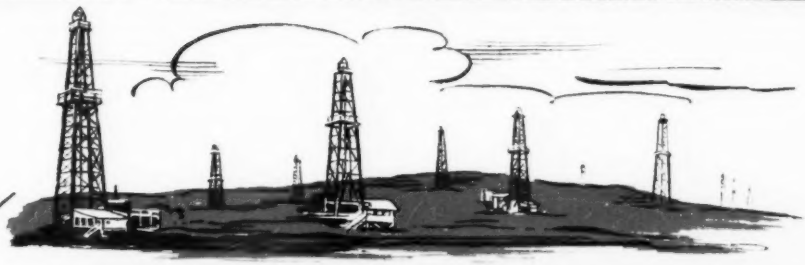
Tulsa Nomads, third Friday of each month. After Five Room, Tulsa Hotel.

Dallas-Fort Worth Nomads, first Monday of each month, Greater Dallas Club.

Houston Nomads, second Monday of each month, Ye Ole College Inn, Houston.

Los Angeles Nomads, second Wednesday of each month, Jonathan Club.

New York Nomads: March 6, April 3, May 10 (annual invitation dinner), all at Louis Sherry's, and June 13-15, golf party, Westchester.



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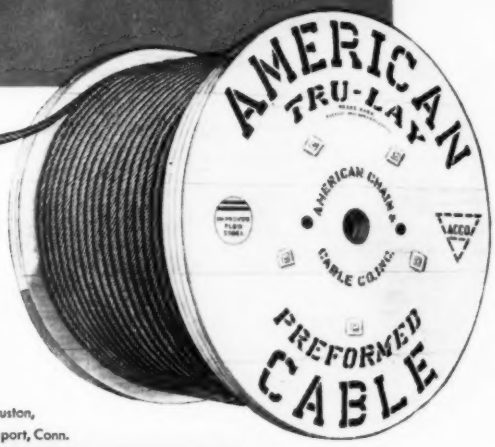

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